Program Guide

March 26-28, 2010 • Doubletree Hotel • Philadelphia, PA





THE EASTERN SOCIETY FOR PEDIATRIC RESEARCH

22nd Annual Meeting

Jointly Sponsored By:
The Center for Continuing Education,
Tulane University Health Sciences Center

Eastern SPR
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Contents

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Help Support our exhibitors by visiting their booths during these hours:

Friday	6:00 pm - 7:30 pm
Saturday	7:30 am - 8:30 am
	10:30 am - 10:45 am
	4:00 pm - 4:15 pm
	6:00 pm - 7:30 pm
Sunday	7:45 am - 8:45 am
	9:30 am - 9:45 am

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Dear Colleagues,

Welcome to the 22nd Annual Meeting of the Eastern Society for Pediatric Research (ESPR) and to our host city of Philadelphia, the Cradle of Liberty!

The Eastern Society for Pediatric Research Council and Planning Committee are confident that you will enjoy our exciting program. Highlights include State-of-the-Art Plenary Talks and the highly popular Lunch with the Professor educational program for trainees, which has been expanded to cover two pertinent topics. High-quality original research is presented in subspecialty platform sessions with leading clinical and scientific authorities moderating the presentations and in two poster sessions.

The goals of the Eastern SPR Annual Meeting are to create a forum where: i) young investigators can present their research in a structured yet relaxed atmosphere, ii) regional clinicians can be exposed to cutting edge clinical and basic science, iii) timely educational programs addressing important topics in Pediatrics are presented and iv) trainees are able to interact with senior investigators and clinicians in an informal setting.

The continued success of our previous meetings has enabled an entirely web-based system for membership, registration and payments, in making timely announcements, in enhanced room booking services, and for the improvement in the overall ease of running the meeting. In addition, we again have centralized informatics enabling presenters to load their slide-show in advance at a speaker-ready station.

ACKNOWLEDGEMENTS: The organization of this meeting would not have been possible without the help of the administrative offices of the American Pediatric Society (APS) and the Society for Pediatric Research (SPR). We are especially grateful to: Debbie Anagnostelis (Executive Director), Kathy Cannon, Belinda Thomas, Jesse Osman and Lisa Thompson. We also recognize the energetic efforts of the Eastern SPR Planning Committee and Council Members for their guidance and vision in selecting this new venue and the efforts of Tulane University in New Orleans as our 2010 sponsor for the CME program. In addition, we thank various members of the regional pediatric community for reviewing the submitted abstracts and for moderating our platform sessions. Lastly, our corporate and leading academic sponsors were instrumental in making this meeting possible.

Most of all, we want to thank you for attending and for contributing your wisdom and experience in the pursuit of excellence. We hope that you enjoy and profit from the meeting, and look forward to your continued participation in future meetings!

Lawrence Nogee, MD
President

Edmund F. La Gamma, MD, FAAP
Secretary

George Porter, Jr. MD, PhD
Chair, Planning Committee

THE EASTERN SOCIETY FOR PEDIATRIC RESEARCH

RECOGNITION OF NEW MEMBERS

The Council of the Eastern Society for Pediatric Research would like to recognize the following new members who have joined the society within the last year.

Membership in the Society reflects not only peer recognition of research achievements in pediatrics, but continuing commitment to pediatric research and fostering the career development the next generation of pediatric researchers. The Council and Society members welcome active participation in the organization. Like our parent organization, the Eastern SPR seeks to promote the generation of new knowledge, the professional growth of the current and next generation of academic pediatricians, and the translation of research discoveries into treatments that will benefit children worldwide. We believe that membership and active participation in the Eastern Society for Pediatric Research can meaningfully contribute to professional success as an academic pediatrician.

To celebrate this achievement, new members will be recognized at the Opening Reception on Friday, March 26, 2010. Once again, congratulations and welcome to the Eastern Society for Pediatric Research.

Peter Belamarich, MD, Children's Hospital at Montefiore Albert Einstein College of Medicine

Mario Cruz, MD, St. Christopher's Hospital for Children

Robert Green, MD, Mount Sinai School of Medicine

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Subhasri Sangam, MD, St. Christopher's Hospital for Children

Robert Shaddy, MD, The Children's Hospital of Philadelphia

Anna Vetrano, PhD, UMDNJ-Robert Wood Johnson Medical School

Meeting Services & CME Accreditation

Registration and CME Desk Hours

Registration will be held on the 3rd floor. Registration hours are as follows:

Friday, March 26	4:00pm – 7:00pm
Saturday, March 27	7:30am – 7:30pm
Sunday, March 28	7:30am – 1:00pm

Abstract Publication

All abstracts being presented at the 2010 Eastern SPR Annual Meeting are printed in this Program Guide, beginning on page 15.

Audio/Visual Information

All oral presentations must be made using PowerPoint. Computers and LCD projectors will be provided. Presenters should have submitted their presentations in advance, are still required to check in at Speaker Ready.

Speaker Ready (Chamber Board Room-4th floor)

Presentations will be loaded onto a central computer during the session prior to the session in which the presentation is to be made (i.e., Friday evening for Saturday morning presentations, Saturday morning for Saturday afternoon presentations, and Saturday afternoon for Sunday morning presentations). Please also bring your CD-ROM, ZIP drive or flash memory.

Business Center

The Business Center at the Doubletree Philadelphia is located on the 3rd floor.

Statement of Need

There are few programs entirely dedicated to presentation of medical research by junior physician scientists across a broad array of medical disciplines. In keeping with the purpose stated by the society in its bylaws, missions and goals, the Eastern Society for Pediatric Research Annual Meeting is organized to foster teaching and investigation, to encourage young investigators and provide a platform for the presentation of original research.

Learner Objectives: At the conclusion of this educational activity, the participant should be better able to:

- Critically evaluate the emerging translational and clinical research.
- Discuss new developments in pathophysiology of human disease with colleagues.
- Identify new areas of investigation which will inform research and improve patient care.
- Develop optimal strategies for clinical investigation and transmission of clinical research results.
- Develop relationships with mentors and peers to address the barriers which interfere with research development.

Target Audience

Multi-specialty clinical & basic researchers; Ph.D. basic/clinical scientists; Medical students who have performed a research project

CME Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of Tulane University Health Sciences Center and the Eastern Society for Pediatric Research. Tulane University Health Sciences Center is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Designation Statement

Tulane University Health Sciences Center designates this educational activity for a maximum of **11.75** *AMA PRA Category 1 Credits™*. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Tulane University Health Sciences Center presents this activity for educational purposes only and does not endorse any product, content of presentation, or exhibit. Participants are expected to utilize their own expertise and judgment while engaged in the practice of medicine. The content of the presentations is provided solely by presenters who have been selected because of their recognized expertise.

Disclosure Policy

It is the policy of the Center for Continuing Education at Tulane University Health Sciences Center to plan and implement all of its educational activities in accordance with the ACCME's Essential Areas and Policies to ensure balance, independence, objectivity and scientific rigor. In accordance with the ACCME's 2004 Standards for Commercial Support, everyone who is in a position to control the content of an educational activity certified for *AMA PRA Category 1 Credit™* is required to disclose all relevant financial relationships with any commercial interests within the past 12 months that creates a real or apparent conflict of interest. Individuals who do not disclose are disqualified from participating in a CME activity. Individuals with potential for influence or control of CME content include planners and planning committee members, authors, teachers, educational activity directors, educational partners, and others who participate, e.g. facilitators and moderators. This disclosure pertains to relationships with pharmaceutical companies, biomedical device manufacturers, or other corporations whose products or services are related to the subject matter of the presentation topic. Any real or apparent conflicts of interest related to the content of the presentations must be resolved prior to the educational activity. Disclosure of off-label, experimental or investigational use of drugs or devices must also be made known to the audience.

How To Obtain Your *AMA PRA* Category 1 Credits™

Tulane and the Eastern Society for Pediatric Research are now using a secure electronic format for evaluation and credit verification. The evaluation remains anonymous but the link does allow you to give us your contact information which will be incorporated into the Certificate of Credit.

At the conclusion of the conference on Sunday, you will be sent a link to an electronic evaluation and credit verification form. If you do not receive this in your inbox on Sunday afternoon, check your spam/junk mailbox. You can contact cme@tulane.edu if you did not receive it and Tulane will send you another link for claiming your credits.

You will receive your certificate of credit by Wednesday, April 21, 2010. If you do not receive it by then, please notify Tulane University at cme@tulane.edu.

Faculty

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Melissa Stockwell
Columbia University
New York, NY

Eastern SPR Schedule-at-a Glance

Doubletree Philadelphia
March 26-28, 2010

Friday, March 26

6:00pm–7:30pm

Poster Session I & Reception
— Symphony Ballroom - 3rd Floor —

Saturday, March 27

7:30am–8:30am

Continental Breakfast
— Symphony Ballroom - 3rd Floor —

8:15am–10:30am

Neonatology - Pulmonology
— Overture - 3rd Floor —

Pulmonary Development
— Concerto - 3rd Floor —

General Pediatrics I
— Aria A - 3rd Floor —

Neurobiology I
— Maestro B - 4th Floor —

Infectious Diseases
— Minuet - 4th Floor —

Endocrinology/Obesity
— Maestro A - 4th Floor —

10:30am–10:45am

Coffee Break
— Symphony Ballroom - 3rd Floor —

10:45am–11:45am

Plenary Session I
PLENARY LECTURE
Susan L. Furth, MD, PhD
Update on the Chronic Kidney Disease in Children Study
— Overture - 3rd Floor —

12:00pm–1:00pm

Meet the Professor Lunch
Heber Nielsen, MD
Demystifying the NIH
— Aria A - 3rd Floor —

Rita Ryan, MD
Top Ten Biostaticstical Errors
— Concerto - 3rd Floor —

Eastern SPR Business Meeting
— Rhapsody - 4th Floor —

1:10pm–4:00pm

Plenary Session II
MENTOR OF THE YEAR
Margaret Hostetter, MD
Heparin and Candida albicans
— Overture - 3rd Floor —

YOUNG INVESTIGATOR PRESENTATIONS: (2:00pm–4:00pm)

4:00pm–4:15pm

Coffee Break
— Symphony Ballroom - 3rd Floor —

4:15pm–5:45pm

Neonatology - Epidemiology and Follow Up
— Concerto - 3rd Floor —

Neonatology - Clinical Studies I
— Overture - 3rd Floor —

Neurobiology II
— Maestro B - 4th Floor—

Immunizations
— Aria A - 3rd Floor —

Cardiovascular
— Minuet - 4th Floor —

General Pediatrics II - Vulnerabilities
— Maestro A - 4thFloor —

6:00pm-7:30pm

Poster Session II & Reception
— Symphony Ballroom - 3rd Floor —

Sunday, March 28

7:45am–8:45am

Continental Breakfast
— Symphony Ballroom - 3rd Floor —

8:30am–9:30am

Plenary Session III
PRESENTATION OF THE YOUNG INVESTIGATOR AWARDS
PLENARY LECTURE
Jon Epstein, MD
Developmental Mechanisms of Cardiovascular Disease
— Overture - 3rd Floor —

9:30am–9:45am

Coffee Break
— Symphony Ballroom - 3rd Floor —

9:45am–12:00pm

Neonatology - Clinical Studies II
— Concerto - 3rd Floor —

Neonatology - Pulmonary Injury
— Overture - 3rd Floor —

Pulmonary and Asthma
— Aria A - 3rd Floor —

General Pediatrics III - Medical Education
— Maestro B - 4th Floor —

Emergency Medicine
— Maestro A - 4th Floor —

GI/Nutrion/Hematology - Oncology
— Minuet - 4th Floor —

Friday, March 26, 2010

Poster Session I

6:00 PM-7:30 PM **Symphony Ballroom**

1 **The Disparity in Preterm Birth for African American Mothers in the Context of Maternal Morbidities**
Erika F. Dennis, Corinne Fager, Scott A. Lorch. – Abstract 1

2 **Predictors of Low Weight (Less Than 10%) at 12 Months Corrected Age in NICU Graduates**
Jordan S. Kase. – Abstract 2

3 **Differences in Hospital Outcomes of Grade 3 and 4 IVH in ELBW Neonates When Withdrawal of Care Is an Option?**
Sabrina Malik, Edmund LaGamma, Boriana Parvez. – Abstract 3

4 **Prognostic Factors for Mortality in Late-Onset Sepsis in VLBW Infants**
Orly L. Levit, Veronika Northrup, Vineet Bhandari, Patrick G. Gallagher, Matthew J. Bizzarro. – Abstract 4

5 **Gender-Specific Effects of Gestational Substance Exposure on Deep Gray Matter and Memory in Young Adults**
Brian B. Avants, Laura M. Betancourt, Joan M. Giannetta, Hengyi Rao, Jiongjiong Wang, James C. Gee, Martha J. Farah, Hallam Hurt. – Abstract 5

6 **Neonatal Hypoxic Ischemic Encephalopathy: Metabolic Predictors of Survival**
Jody L. Zisk, Kevin Dysart, Janet Larson, Susan Adeniyi-Jones. – Abstract 6

7 **Diffuse Correlative Spectroscopy (DCS) Enhances Neuromonitoring of Cerebral Hemodynamics in Postoperative Cardiac Patients during Blood Transfusions**
Donna A. Goff, Erin M. Buckley, Turgut Durduan, Rickson Mesquita, Meeri N. Kim, Grady H. Hedstrom, Arjun G. Yodh, Daniel J. Licht. – Abstract 7

8 **Mechanism of Phosphorylation of Bcl-2 during Hyperoxia in the Cerebral Cortex of Newborn Piglets**
Subhasri Sangam, Shilpa Dass, Nicholas Obiri, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 8

9 **Mechanism of Caspase-3 Expression during Hyperoxia in the Cerebral Cortex of Newborn Piglets**
Lynn Fuchs, Heidi Taylor, Qazi Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 9

10 **Mechanism of Phosphorylation of Caspase-9 in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets Following Hyperoxia**
Aparna Patra, Meredith Monaco, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 10

11 **Effect of Continuous Glucose Monitoring (CGM) on Quality of Life, HbA1C, Fasting Blood Glucose and the Variability of Blood Glucose Reading in Children with Type 1 Diabetes Mellitus**
Vista Shakiba, Sharzad J. Alagheband, Jean Corrigan, Siham Accacha. – Abstract 11

12 **Short Term Treatment with Anastrozole Does Not Affect Bone Strength in Pubertal Boys with Short Stature**
Sofia Shapiro, Julia Chen, Oksana Lekarev, Joseph Fusco, G. Felipe Duarte, Elizabeth J. Wallach, Karl J. Jepsen, Robert Rapaport. – Abstract 12

13 **Neuroimaging Plays a Role in Evaluation of Pituitary Defects in Children with ISS**
Oksana Lazareva, Priyanka Fernandez, Irene Mamkin, Amrit Bhangoo, Svetlana Ten. – Abstract 13

14 **Variations in Management of Diabetic Ketoacidosis amongst Pediatricians and Sub-Specialists in United States**
Sonal R. Chandratre, Aamod C. Soman, Fernanda Kupferman, Susana Rapaport, Fatema Meah, Louis Primavera, Lily Lew. – Abstract 14

15 **Pharmacologic Manipulation of Adrenal Nicotinic Acetylcholine Receptors – Potential for Prevention of Hypoglycemia Associated Autonomic Failure (HAAF)**
Dumitru S. Turcanu, Bistra B. Nankova, Edmund F. LaGamma. – Abstract 15

16 **Knowledge and Practices about Vitamin D Supplementation among Pediatricians and Family Practitioners**
Pratibha Rana, Fernanda Kupferman, Susana Rapaport, Lily Lew. – Abstract 16

17 **Sex Related Analysis of ALT and Its Association with Metabolic Profile in Obese Children**
Rishi Gupta, Vipin Lohiya, Irene Mamkin, Sonal Bhandari, Svetlana B. Ten. – Abstract 17

18 **The Correlates of Attributes of the Built Environment around Schools and Self-Reported Physical Activity in Inner City Fifth Graders**
James J. Burns, Aimee Velasco, Jane Garb. – Abstract 18

19 **Travel Patterns and Resource Use by Urban, Minority Children in East Harlem, New York**
Leigh S. Goldstein, Maida P. Galvez, Susan L. Teitelbaum, Mary S. Wolff, Barbara Brenner. – Abstract 19

20 **Waist Circumference z-Scores Are Better Correlates of Multiple Adiposity-Related Co-Morbidity Risk Factors Than BMI z-Scores in Early Adolescence**
M. George, O. Galescu, A. Bhangoo, S. Bhandhari, R. Karp, K. Pavlovich, M. Rosenbaum, D. DeSantis, L. Altshuler, B. Lowell, S. Shelov, R. Rapaport, W. Rosenfeld, S. Accacha, P. Speiser , S. Ten. – Abstract 20

21 **Waist Circumference Is a Better Marker Than BMI in Predicting Body Fat and Insulin Sensitivity in Middle School Children**
M. George, O. Galescu, A. Bhangoo, S. Bhandhari, R. Karp, K. Pavlovich, M. Rosenbaum, D. DeSantis, L. Altshuler, B. Lowell, S. Shelov, R. Rapaport, W. Rosenfeld, S. Accacha, P. Speiser , S. Ten. – Abstract 21

22 **The Use of Body Image Silhouettes in a Latino Community**
Caryn Kerman, Timi Chu, John Rausch, Mary McCord. – Abstract 22

23 **A Novel Approach To Combat Pediatric Obesity Modeled after a Successful Program for Adults**
Asha D. Willis, Laura A. Wedemeyer, Michelle G. Dresser, Cathy Nonas, Lynn D. Silver. – Abstract 23

24 **Is Decreasing Visual Acuity Associated with Higher BMI in Children?**
Ali F.Ahrabi, Paola Carugno. – Abstract 24

25 **Short and Long Term Neurodevelopmental Outcomes after Treatment of Patent Ductus Arteriosus with Ibuprofen Versus Indomethacin**
Alla Kushnir, Joaquim M.B. Pinheiro. – Abstract 25

26 **Comparison of Renal Effects of Ibuprofen Versus Indomethacin during Treatment of Patent Ductus Arteriosus**
Alla Kushnir, Joaquim M.B. Pinheiro. – Abstract 26

27 **Is There a Genetic Basis for Responsiveness of PDA to Ibuprofen in Premature Neonates?**
Kiran Dwarakanath, Bridget Oliveri, Kristen Aland, Divya Chhabra, Mitashi Singh, Johanna Calo, Lance A. Parton. – Abstract 27

28 **Patent Ductus Arteriosus in Extremely Preterm Infants: How Many Courses of Indomethacin Are Appropriate before Surgical Ligation?**
Lynda Adrouche-Amrani, Karen M. Gluck, Jing Lin, Robert S. Green, Ian R. Holzman. – Abstract 28

29 **Car Seat Tests – Are They Worth It?**
David L. Schutzman, Rachel Porat, Agnes Salvador, Michael Janeczko, Louis Weisberg, Nghia Tran, John Turchi, John Hurley. – Abstract 29

30 **Car Safety Seat Testing in Level I Nurseries: Are We There Yet?**
Priya Bhaskar, Sharon Pao, Marsha Waggoner, Karen R. Carpenter. – Abstract 30

31 **Tidal Volume in Infants with Congenital Diaphragmatic Hernia**
Saumya Sharma, Kabir M. Abubakar, Martin Keszler. – Abstract 31

32 **Adaptive Control of Inspired O_2 To Maintain Oxygenation Stability in Preterm Infants**
Kee H. Pyon, Zubair Aghai, Gary E. Stahl, Vishwanath Bhat, Sulaiman Sannoh, Judy G. Saslow. – Abstract 32

33 **Timing the Peak Occurrence of NEC in Premature Infants ≤ 34 Weeks Gestation**
Naveed Hussain, Aniruddha S. Vidwans. – Abstract 33

34 **Prospective Randomized Control Trial of Restrictive Fluid Management in Transient Tachypnea of the Newborn**
Annemarie Stroustrup, Ian R. Holzman. – Abstract 34

35 **Retrospective Study of Epinephrine Use in the Delivery Room Resuscitation of Infants Born ≤ 25 Weeks**
Bobby Mathew, Satyan Lakshminrusimha, Rita M. Ryan. – Abstract 35

36 **How Often Are Very-Low-Birth-Weight (VLBW) Infants Normocarbic, Normothermic and Normoglycemic after Birth?**
Neetu Singh, Gautham Suresh. – Abstract 36

37 **Reference Values for Nocturnal Oxygen Saturation in Healthy Preterm Infants**
Tregony Simoneau, Kara Palm, Catherine Correia, Jaclyn Davis, Lawrence M. Rhein. – Abstract 37

38 **NICU Redesign from Open Ward (OW) to Private Room (PR): A Longitudinal Study of Parent and Staff Perceptions**
Ben H. Lee, Jonathan R. Swanson, Caryn A. Peters. – Abstract 38

39 **Compliance of Pediatricians at an Urban Community Hospital with American Academy of Pediatrics Guidelines for Screening of Autism Spectrum Disorders before and after Educational Intervention**
Mahesh Chikkannaiah, Monideep Dutt, Fernanda Kupferman, Jose Serruya, Louis Primavera, Susana Rapaport, Kanchana Roychoudhury. – Abstract 39

40 **Parental Assessments of Quality of Life of Adolescents with Autism Spectrum Disorders**
Emily N. Neger, Deborah Shipman, R. Christopher Sheldrick, Ellen C. Perrin. – Abstract 40

41 **Exposure of Child and Adolescent Psychiatry Fellows to Autism Spectrum Disorder**
Sandy H. Rhee, Basant Pradhan, Wendy Ross. – Abstract 41

42 **Factors Affecting Parental Mental Health Treatment Initiation in Children and Adolescents**
Elliott V. Levin, Joy P. Brock, Janee B. Henderson. – Abstract 42

43 **The Role of a Community Hospital in Implementing a School-Based Seasonal Influenza Vaccination Project in the South Central Bronx**
Lauren C. Brown, Murli Purswani, Tess K. Wiskel, David D. Blomquist, Sarah E. Sullivan, Julie A. Comley, Anne Burrowes, Diane G. Strom. – Abstract 43

44 **Estimating Validity and Accuracy of Vaccine Recall**
Sachin N. Desai, Daina Esposito, Marietta Vazquez. – Abstract 44

45 **Effect of Massage on Methadone Exposed Infants, RCT**
Yun J. Lee, Barry M. Lester, Mary M. Roberts, Pauline Wright, Joseph M. McNamara. – Abstract 45

46 **Provider Acceptance of Universal Depression Screening**
John Rausch, William Rausch, Karen Soren. – Abstract 46

47 **Urogenital Symptoms in Pre-Menarchal Girls: Prevalence and Associations**
Cynthia W. DeLago, Carmen V. Vasquez, Claudia Clarke. – Abstract 47

48 **Urogenital Symptom-Reporting: Sexual Abuse vs. Exposure to Genital Irritants in Pre-Menarchal Girls**
Cynthia W. DeLago, Claudia Clarke, Martin Finkel. – Abstract 48

Saturday, March 27, 2010

Neonatology - Pulmonology Platform Session

8:15 AM-10:30 AM **Overture**

Moderator: Shetal Shah, MD

8:15 AM **Pulmonary Hemodynamics in Asphyxiated Lambs Resuscitated with 21% and 100% Oxygen**
Fabio J. Savorgnan, Daniel D. Swartz, Bobby Mathew, Karen A. Wynn, Rita M. Ryan, Satyan Lakshminrusimha. – Abstract 49

8:30 AM **Transit In Utero Knockout (TIUKO) of the Cystic Fibrosis Conductance Regulator (ASCFTR) Alters the Cytokine Response to Birth Hyperoxia in the Lungs of Sprague-Dawley Rat Pups**
Rachael Grodick, J. Craig Cohen, Shetal Shah. – Abstract 50

8:45 AM **Does Epigenetics Play a Role in Bronchopulmonary Dysplasia?**
Jayanth Kocherlakota, Kristen Aland, Johanna Calo, Vanessa Mercado, Lance A. Parton. – Abstract 51

9:00 AM **Structural and Functional Changes in Neonatal Sprague Dawley Rats Lungs Exposed to Antenatal Magnesium Sulfate**
Swati Aleti-Jacobs, Erin Kileen, Janet Larson, J. Craig Cohen, Shanthy Sridhar. – Abstract 52

9:15 AM **Mitochondrial Superoxide Dismutase Polymorphism and the Susceptibility for Bronchopulmonary Dysplasia**
Edward Hurley, Kristen Aland, Johanna Calo, Lance A. Parton. – Abstract 53

9:30 AM **Single Nucleotide Polymorphisms of Extracellular Superoxide Dismutase (EC-SOD) in the Pathogenesis of Bronchopulmonary Dysplasia**
Johanna M. Calo, Hima Maramreddy, Joie Fisher, Divya Chhabra, Kiran Dwarakanath, Sonya Strassberg, Mitashi Singh, Kristen Aland, Lance A. Parton. – Abstract 54

9:45 AM **Incidence of and Risk Factors for Bronchopulmonary Dysplasia in Non-Ventilated Preterm Infants**
Renee M. Behme, Sharon Kirkby, Wendy Turenne, Linda Genen, Jay Greenspan, Kevin Dysart. – Abstract 55

10:00 AM **Do Plasminogen Activator Inhibitor-1 Single Nucleotide Polymorphisms Increase the Susceptibility of ELBW Infants to Bronchopulmonary Dysplasia?**
Divya Chhabra, Johanna Calo, Kristen Aland, Kiran Dwarkanath, Amanda Walsh, Lance A. Parton. – Abstract 56

10:15 AM **Vascular Endothelial Growth Factor Gene Polymorphism Is Associated with Susceptibility to Bronchopulmonary Dysplasia in ELBW Infants**
Noorjahan Ali, Johanna Calo, Kristen Aland, Lance A. Parton. – Abstract 57

Pulmonary Development Platform Session

8:15 AM-10:30 AM **Concerto**

Moderator: Heber Nielsen, MD

8:15 AM **IUGR Inhibits Pulmonary VEGF Expression in Rat Pups**
Omotola O. Uwaifo, Norma B. Ojeda, Barbara T. Alexander. – Abstract 58

8:30 AM **Hormonal Maintenance of Surfactant Production in Cultured Type II Cells of Adult Human Lung**
Philip L. Ballard, Jae W. Lee, Xiaohue Fang, Cheryl C. Chapin, Linda W. Gonzales, Venkatadri Kolla, Michael A. Matthay. – Abstract 59

8:45 AM **CC10 mRNA Expression during Early Development: Impact of Surfactant and rhCC10 Treatments**
T.L. Hubert, J. Wu, K. Kimura, S. Higuchi, S. Eguchi, T.H. Shaffer, M.R. Wolfson. – Abstract 60

9:00 AM **MicroRNA miR-205 Is Downregulated during Type II Alveolar Epithelial Cell Differentiation**
Ruth B. Seabrook, Haiyan Xaio, Linda W. Gonzales, Qing S. Lin. – Abstract 61

9:15 AM **Knock-Down of Presenilin-1 (PSEN-1) Blocks ErbB4-Regulated Surfactant Synthesis in MLE-12 Cells**
Anika Ritzkat, Ekaterini Pringa, Melissa Dere, Cristina Scapin, Oya Guengoeze, MaryAnn V. Volpe, Christiane E.L. Dammann, Heber C. Nielsen. – Abstract 62

9:30 AM **MiR-221 and miR-130 in Developing Lung: Role in Hox Gene Regulation**
S. Mujahid, H.C. Nielsen, M.V. Volpe. – Abstract 63

9:45 AM **MUC1 in the Developing Lung: Response to Inflammation**
J. Wu, T.L. Hubert, Y. Park, K. Kato, K.C. Kim, T.H. Shaffer, M.R. Wolfson. – Abstract 64

10:00 AM **Pulmonary Vascular Resistance (PVR) Response to Oxygen Is Altered by Inhaled Nitric Oxide (iNO) in Lambs with PPHN**
Satyan Lakshminrusimha, Bobby Mathew, James A. Russell, Karen A. Wynn, Rita M. Ryan, Jayasree Nair, Daniel D. Swartz. – Abstract 65

10:15 AM **Intrauterine Growth Restriction Decreases Airway Responsiveness to Methacholine in Female Rats**
Catalina Bazacliu, Melissa Carmen, Bobby Mathew, Rita M. Ryan, Satyan Lakshminrusimha, Daniel D. Swartz. – Abstract 66

General Pediatrics I
Platform Session

8:15 AM-10:30 AM **Aria A**

Moderator: Imam Sharif, MD

8:15 AM **Wishful Thinking: Safe Transportation of Newborns at Hospital Discharge**
S.C. Rogers, K. Gallo, H. Saleheen, G. Lapidus. – Abstract 67

8:30 AM **Storing Medical History on USB Drives: The CHAM DRIVE Project**
Sara M. Marnell, Katherine Freeman, Catherine C. Skae. – Abstract 68

8:45 AM **Internet Use by Parents for Health Information in an Urban Community**
Lorena Muniz, Wipanee Phupakdi, David H. Rubin. – Abstract 69

9:00 AM **Use of a Patient Portal in Pediatrics**
Iman Sharif, David West. – Abstract 70

9:15 AM **Addressing Children's Hospital Crowding by Smoothing Occupancy**
Evan Fieldston, Matthew Hall, Samir Shah, Marion Sills, Anthony Slonim, Angela Myers, Courtney Cannon, Susmita Pati. – Abstract 71

9:30 AM **Relationship between Housing Characteristics and Environmental Exposures in Urban Minority Children**
Marissa Hauptman, Mary S. Wolff, Maida P. Galvez, Barbara Brenner, Susan Teitelbaum. – Abstract 72

9:45 AM **Bed Usage in the Pediatric Intensive Care Unit**
Evan Fieldston, Christian Terwiesch, Joshua Metlay, CHOP PICU Research Group. – Abstract 73

10:00 AM **Using Patient Satisfaction Scores To Identify Disparities in Care**
Maria Petrini, Mariane Stefano, Alex Koster, Jobayer Hossain, Magdy Attia, Jay Greenspan, Iman Sharif. – Abstract 74

10:15 AM **Measuring Connectedness in the Health Care Setting: Reliability and Factor Analysis of the Adolescent-Physician Connectedness Scale**
Monique J. Collier, Unab I. Khan, Jason Fletcher, Susan M. Coupey. – Abstract 75

Neurobiology I
Platform Session

8:15 AM-10:30 AM **Maestro B**

Moderator: Daniel Licht, MD

8:15 AM **Development of a Semiquantitative Fetal Brain Maturation Score on MRI**
Daniel J. Licht, Catherine Limperopoulos, Adre J. du Plessis, James C. Gee, Jue Wu, Grady Hedstrom, Suyash P. Awate, Arastoo Vossough. – Abstract 76

8:30 AM **Maturational Arrest of Oligodendrocyte Lineage in Intraventricular Hemorrhage**
Krishna Dummula, Govindaiah Vinukonda, Furong Hu, Muhammad T. Zia, Doreen Badheka, Praveen Ballabh. – Abstract 77

8:45 AM **SS-31, a Mitochondria-Targeted Cytoprotective Peptide, Is Neuroprotective in Male but Not Female Neonatal Rats Following Cerebral Hypoxia-Ischemia**
Marie T. Berg, Hazel S. Szeto, Queenie B. Brown, Jeffrey M. Perlman, Susan J. Vannucci. – Abstract 78

9:00 AM **MRI and Neurosensory Impairment (NSI) in Infants with Hypoxic Ischemic Encephalopathy (HIE) Treated with Head Cooling (HC)**
Raquel Gomez, Shobhana Desai, Marcy Gringlas, Susan Adeniyi-Jones. – Abstract 79

9:15 AM **Neural Recovery in Neonates Treated with Head Cooling: Early Motor Skills and Developmental Assessment at 12 Months**
Susan V. Duff, Marcy Gringlas, Kanan Shah, Heather Aldridge, Shobhana Desai, Susan Adeniyi-Jones. – Abstract 80

9:30 AM **Correlation of Proton Magnetic Resonance Spectroscopy (MRS) and Volumetric MRI of the Preterm White Matter**
Erlita Gadin, David A. Paul, Amy Mackley, Kert Anzilotti, Karl Steiner, Michele Lobo, Kanik Sem, James C. Galloway. – Abstract 81

9:45 AM **Reduced Effects of Gestational Cocaine Exposure (GCE) on Resting Cerebral Blood Flow (CBF) in Young Adults: A Follow-Up Study**
Hengyi Rao, Hallam Hurt, Joan Giannetta, Marc Korczykowski, John Pluta, Laura Betancourt, Brian Avants, James Gee, Jiongjiong Wang, John Detre. – Abstract 82

10:00 AM **Gestational Age + 5? Monitoring Autoregulation in the Preterm Infant**
Maureen M. Gilmore, Brian Stone, Jennifer Shepard, Ken M. Brady. – Abstract 83

10:15 AM **Chronic Intermittent Hypoxia Increases the Myogenic Tone of Rat Medium Cerebral Arteries**
Vlad D. Ianus, Rayna J. Gonzale, Nancy L. Kanagy. – Abstract 84

Infectious Diseases
Platform Session

8:15 AM-10:30 AM **Minuet**

Moderators: Elijah Paintsil, MD & Mary Harris, MD

8:15 AM **Cerebrospinal Fluid (CSF) Cytokines Are Predictors of Bacterial Meningitis in Infants**
Lakshmi Srinivasan, Laurie Kilpatrick, Samir S. Shah, Soraya Abbasi, Shelley Rankin, Michael A. Padula, Karin L. McGowan, Kaitilin Mahoney, Mary C. Harris. – Abstract 85

8:30 AM **Effect of Comprehensive Infection Control Measures on the Rate of Late Onset Infection in Very Low Birth Weight Infants**
Linda Wicker, Judy G. Saslow, Sahil Shah, Vishwanath Bhat, Sulaiman Sannoh, Nicole Kemble, Emma Brandon, Kee H. Pyon, Gary E. Stahl, Zubair H. Aghai. – Abstract 86

8:45 AM **How Quickly Are Blood Cultures Positive in Infants? A Prospective Study**
Michael A. Padula, Maya L. Dewan, Samir S. Shah, Karin L. McGowan, Kaitilin R. Mahoney, Mary C. Harris. – Abstract 87

9:00 AM **Cost Effective and Safe Management of Early Onset, Asymptomatic Presumed Neonatal Sepsis with Intramuscular Antibiotics**
Binta Lambert, Koryse Woodrooffe, Deborah E. Campbell, Suhas M. Nafday. – Abstract 88

9:15 AM **National Childhood Pneumonia Rates and Trends in Antibiotic Prescribing, 1994-2007**
Matthew P. Kronman, Rui Feng, Yuan-Shung Huang, Grace E. Lee, Samir S. Shah. – Abstract 89

9:30 AM **Extrapulmonary Manifestations of Mycoplasma Pneumonia in Children**
Susmita Senepati, Fernanda Kupferman, Louis H. Primavera, Susana Rapaport, Dakshayani Guttal. – Abstract 90

9:45 AM **n-3 Polyunsaturated Fatty Acids EPA and DHA Inhibit Pro-Inflammatory Cytokine Release**
Michael M. Espiritu, Hong Lin, Susanna Cunningham-Rundles, Jeffrey M. Perlman. – Abstract 91

10:00 AM **Prevalence and Pattern of Disclosure of HIV Status in HIV-Infected Children in Ghana**
Stacey Kallem, Lorna Renner, Musie Ghebremichael, Elijah Paintsil. – Abstract 92

10:15 AM **Use of the Rapid HIV Test in the Newborn and Cord Blood**
Laura Malaga, Prabi Rajbhandari, Juhi Purswani, Stefan Hagmann, James Dunne, Murli Purswani. – Abstract 93

Endocrinology / Obesity Platform Session

8:15 AM-10:30 AM **Maestro A**

Moderator: John Rausch, MD, MPH

8:15 AM **Familial Short Stature Due to a Novel Splice Site Mutation in the *SHOX* Gene**
Jennifer Danzig, Michael A. Levine. – Abstract 94

8:30 AM **Associations between Obesity, Asthma and Inflammation in Inner-City Adolescents**
Unab I. Khan, Carmen R. Isasi, Susan M. Coupey, Deepa Rastogi, Christopher Andrade. – Abstract 95

8:45 AM **Parental Perceptions and Attitudes toward Obesity in a Latino Community**
Caryn Kerman, Timi Chu, John Rausch, Mary McCord. – Abstract 96

9:00 AM **The Relationship between Physical Activity and Depression among US Adolescents in a National Sample**
John Rausch. – Abstract 97

9:15 AM **Accuracy of Parental Recall of Birthweight and Associations between Birthweight and Subsequent Body Mass Index in Minority, Inner City Children**
Carolyn H. Marcus, Maida P. Galvez, Susan L. Teitelbaum, Mary S. Wolff. – Abstract 98

9:30 AM **The Effect of School Physical Activity on Students' Leisure Activity in a Predominantly Urban Latino Community**
Dana Sirota, Evelyn Jenkins-Berger, Raquel Andres Martinez. – Abstract 99

9:45 AM **Baseline Readiness of Morbidly Obese Inner-City Adolescents To Change Diet and Activity Behaviors**
Eleanor Bathory, Jessica Rieder, Arthur E. Blank. – Abstract 100

10:00 AM **New Anthropometric Indices for Predicting Risk for Insulin Resistance**
M. George, O. Galescu, A. Bhangoo, S. Bhandari, K. Pavlovich, M. Rosenbaum, D. DeSantis, L. Altshuler, B. Lowell, S. Shelov, R. Rapaport, W. Rosenfeld, P. Speiser, S. Accacha, S. Ten , R. Karp. – Abstract 101

10:15 AM **Fasting Serum IGFBP-1 with Fasting Serum Insulin Is a More Sensitive Marker of Insulin Resistance and Hypertriglyceridemia in Children**
Rishi Gupta, S. Accacha, L. Altshuler, A. Bhangoo, C. Boucher-Berry, B. Broschart, D.E. Carey, M. Chickajajur, M. Chatterjee, D. DeSantis, I. Fennoy, L. Font, A. Hassoun, L. Iazzetti, F. Jacques , A. Jean, A. Koltun, B. Lowell, K. Pavlovich, R. Rapaport, M. Rosenbaum, W. Rosenfeld, E. Shamoon, S. Shelov, P.W. Speiser, S. Ten. – Abstract 102

Plenary Session I

10:45AM-11:45AM **Overture**

10:30PM **Plenary Lecture - Update on the Chronic Kidney Disease in Children Study**
Susan L. Furth, MD, PhD, Children's Hospital of Philadelphia, Philadelphia, PA

Meet the Professor Lunch

12:00PM-1:00PM **Aria A**
Demystifying the NIH
Heber Nielsen, MD

12:00PM-1:00PM **Concerto**
Top Ten Biostatistical Errors
Rita Ryan, MD

Eastern SPR Business Meeting

12:00PM-1:00PM **Rhapsody**

Mentor of the Year & Young Investigator Presentations

1:10PM-4:10PM **Overture**

1:10PM **Mentor of the Year Presentation**
Heparin and Candida albicans
Margaret Hostetter, MD, Yale University School of Medicine, New Haven, CT

Young Investigator Presentations

2:00 PM **Clinical Prediction Modeling To Stratify ROP Risk Using Postnatal Weight Gain**
Gil Binenbaum, Gui-shuang Ying, Graham E. Quinn, Karen Karp, Robin S. Roberts, Haresh Kirpalani, The PINT Study Group. – Abstract 103

2:15 PM **Determinants of the Interpersonal Variation in Treatment Response to Anti-HIV Nucleoside Analogs**
Elijah Paintsil, Ginger Dutschman, Rong Hu, Yung-Chi Cheng. – Abstract 104

2:30 PM **NJ Seeds Hospital Day: Impact of a Hospital-Based Program on Student Career Choice**
Scott Vergano, Ben H. Lee. – Abstract 105

2:45 PM **Break**

3:00 PM **Impact of Language Exposure in the NICU on the Development of Vocalizations in Preterm Infants**
Melinda Caskey, Betty Vohr, Bonnie Stephens, Richard Tucker. – Abstract 106

3:15 PM **Sinus Node Dysfunction in Long QT Syndrome: Involvement of HCN Pacemaker Current**
Pooja D. Kulkarni, Yelena Kryukova, Richard B. Robinson. – Abstract 107

3:30 PM **Impact of Delivery Room (DR) Resuscitation on Outcomes of Very Low Birth Weight (VLBW) Infants: Results from the Caffeine for Apnea of Prematurity (CAP) Trial**
Sara B. DeMauro, Robin S. Roberts, Peter Davis, Ruben Alvaro, Aida Bairam, Barbara Schmidt, The CAP Trial Investigators. – Abstract 108

3:45 PM **Norepinephrine Induced Ovine Mesenteric Artery Constriction Peaks in Late Preterm Gestation: Implications in Pathogenesis of Necrotizing Enterocolitis**
Jayasree Nair, Bobby Mathew, Melissa Carmen, James A. Russell, Satyan Lakshminrusimha. – Abstract 109

Neonatology - Epidemiology & Followup Platform Session

4:15 PM-5:45 PM **Concerto**

Moderator: Bonnie Stephens, MD

4:15 PM **The Impact of Treatment Hospitals on the Disparity in Preterm Birth Experienced by African American Women**
Erika F. Dennis, Corinne Fager, Scott A. Lorch. – Abstract 110

4:30 PM **Racial Disparities in Maternal Oral Health Experiences in 10 States, Pregnancy Risk Assessment Monitoring System, 2004-2006**
Sunah S. Hwang, Vincent C. Smith, Marie C. McCormick, Wanda D. Barfield. – Abstract 111

4:45 PM **Assessment of Language Development and Related Risk Factors in Preterm Infants**
Roschanak Mossabeb, William Francia, Kathleen Finnegan, Soraya Abbasi. – Abstract 112

5:00 PM **The Incidence of Morbidities and NICU Admissions among Early Term (37-38 6/7 Weeks) and Late Term (39-41 Weeks) Neonates at Women and Children's Hospital of Buffalo (WCHOB)**
Shaon Sengupta, Alyssa Herrmann, Vivien Carrion, Rita Ryan, James Shelton, Satyan Lakshminrusimha. – Abstract 113

5:15 PM **Outcome of Preterm and Late Preterm Multiple Gestations Conceived by Assisted Reproduction**
Ime Essien-Lewis, Preston Hoffman-Williamson, Toni Mancini, Emidio Sivieri, Soraya Abbasi. – Abstract 114

5:30 PM **Predictors of Mortality, Length of Stay and Co-Morbid Hypothermia in Hospitalized Neonates with Pneumonia in Eritrea, Africa**
Shetal I. Shah, O. Zemichael, Hong Dao Meng. – Abstract 115

Neonatology - Clinical Studies I Platform Session

4:15 PM-5:45 PM **Overture**

Moderator: Khodayar Rais-Bahrami, MD

4:15 PM **Validation of Visible Light Tissue Oximetry in Newborn Infants**
Nahid Rostami, Martin Keszler. – Abstract 116

4:30 PM **Comparison of Simultaenous Cerebral Oximeter and Pulse Oximeter Data in Preterm Infants with RDS**
Nickie Niforatos, Mariam Said, Khodayar Rais-Bahrami. – Abstract 117

4:45 PM **Cardio Respiratory Monitoring in the NICU: Evaluation of a Wireless Monitor**
N. Adu-Amankwa, K. Rais- Bahrami. – Abstract 118

5:00 PM **Is Screening for Retinopathy of Prematurity Necessary in Growth Restricted Neonates Born after 30 Weeks Gestation?**
Leslie Pierce, Annemarie Stroustrup, Ian R. Holzman, Edward Raab. – Abstract 119

5:15 PM **Quality Improvement (QI) Project To Improve Admission Temperatures in Very Low Birth Weight Infants**
Suhas M. Nafday, Binta Lambert, Deborah E. Campbell. – Abstract 120

5:30 PM **Short Term Effects of the Use of Incubator Covers on Preterm Infants with Birthweight Less Than 1500 grams**
Swati Aleti-Jacobs, Donna Baranek, Carol Catania, Kathy Gerke, Shanthy Sridhar. – Abstract 121

Neurobiology II Platform Session

4:15 PM-5:45 PM **Maestro B**

Moderator: Robert Kalb, MD

4:15 PM **Mechanism of Activation of cAMP Response Element Binding (CREB) Protein during Hyperoxia in Neuronal Nuclei of Newborn Piglets**
Erica Mandell, Shilpa Dass, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 122

4:30 PM **Insulin Growth Factor (IGF) Signaling Pathway Is an Important Defense Against Hypoxic Neuronal Injury**
Saima Aftab, Robert Kalb. – Abstract 123

4:45 PM **Interleukin-6 (IL-6) Reduces Tight Junction Protein Expression in Cerebral Cortical Microvessel Endothelial Cells from Young and Adult Sheep**
Susan S. Cohen, Erin E. Cummings, Grazyna B. Sadowska, Steven W. Threlkeld, Surendra Sharma, Barbara S. Stonestreet. – Abstract 124

5:00 PM **Nitric Oxide Counters the Hyperoxia-Induced Pro-Inflammatory Phenotype in Astrocytes**
Christie Bruno, Todd Greco, Harry Ischiropoulos. – Abstract 125

5:15 PM **Mechanism of Caspase-3 Activation during Hyperoxia in the Cerebral Cortex of Newborn Piglets**
Lynn Fuchs, Heidi Taylor, Qazi Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 126

5:30 PM **Age Dependent Inter-Alpha Inhibitor Protein (IAIP) Expression in Ovine Cerebral Cortex (CC)**
Mariya Spasova, Steven Threlkeld, Grazyna Sadowska, Yow-Pin Lim, Barbara S. Stonestreet. – Abstract 127

Immunizations Platform Session

4:15 PM-5:45 PM **Aria A**

Moderator: Barbara Kelly, MD

4:15 PM **Three-Year Experience with Administration of Trivalent Inactivated Influenza (TIV) Vaccine to Parents of High-Risk Infants in the Neonatal Intensive Care Unit (NICU) Demonstrates Sustainability**
Angeline Seah, Shetal Shah. – Abstract 128

4:30 PM **Impact of a Tdap Postpartum Intervention on Timeliness of Early Infant Immunization**
Ishminder Kaur, Krissa George, Carolina Pena-Ricardo, Barbara Watson, Barbara Kelly. – Abstract 129

4:45 PM **Effect of Rotavirus Vaccination on Hospitalization and Seasonality of Disease from Rotavirus Infection in Pediatric Patients**
Haytham Hamwi, Babu Bangaru, Susana Rapaport, Louis Primavera, David Di John. – Abstract 130

5:00 PM **Getting the RSV Season Onset and Offset Right To Optimize Immune Prophylaxis**
Jennifer Vodzak, Yolanda M. Inumerable, Alan T. Evangelista, Sarah S. Long. – Abstract 131

5:15 PM **Extent and Timeliness of Seasonal Influenza Vaccine Coverage in Children from an Underserved Community, 2004-2008**
Annika M.O. Hofstetter, Karthik Natarajan, Raquel Andres Martinez, Melissa S. Stockwell. – Abstract 132

5:30 PM **Parental Knowledge and Attitudes towards Human Papillomavirus Vaccine and Willingness To Vaccinate Urban Adolescents**
Alina Stanica, Patricia Burris-Warmoth, Louis Primavera, Fernanda Kupferman-Meik. – Abstract 133

Cardiovascular Platform Session

4:15 PM-5:45 PM **Minuet**

Moderator: Matt Gillespie, MD

4:15 PM **Donor Troponin I Levels and Graft Survival in Pediatric Heart Transplantation**
Kimberly Y. Lin, Patrick Sullivan, Abdul Salam, Beth Kaufman, Stephen Paridon, Brian D. Hanna, Thomas L. Spray, Janice Weber, Robert E. Shaddy. – Abstract 134

4:30 PM **Transient In Utero Knockout (TIUKO) of the CFTR Gene Results in Increased Levels of Myocardial Inflammatory Markers in Adult Sprague-Dawley Rat Pups**
Rachael Grodick, Angeline Seah, J. Craig Cohen, Shetal Shah. – Abstract 135

4:45 PM **Intrauterine Growth Restriction Alters Norepinephrine Response in Rat Aortas in a Developmental and Gender Specific Manner**
Catalina Bazacliu, Melissa Carmen, Bobby Mathew, Rita M. Ryan, Satyan Lakshminrusimha, Daniel D. Swartz. – Abstract 136

5:00 PM **Comparison of Mesenteric Tissue Oxygenation during Indomethacin and Ibuprofen Therapy for Patent Ductus Arteriosus in Preterm Infants**
Mayoor Bhatt, Anna Petrova, Rajeev Mehta. – Abstract 137

5:15 PM **Mitochondria Structure and Function Matures during Mammalian Cardiac Development**
Jennifer Hom, Rodrigo Quintanilla, Shey-Shing Sheu, George A. Porter. – Abstract 138

5:30 PM **Modified Response to Calcium by PAK Phosphorylation of Cardiac Troponin I**
Jonathan J. Edwards, John C. Robinson, Genaro Ramirez-Correa, Anne M. Murphy. – Abstract 139

General Pediatrics II - Vulnerabilities Platform Session

4:15 PM-5:45 PM **Maestro A**

Moderator: Melissa Stockwell, MD, MPH

4:15 PM **Endocrine Disruptors and Childhood Social Impairment**
Amir Miodovnik, Mary S. Wolff, Chenbo Zhu, Antonia M. Calafat, Minori J. Silva, Stephanie M. Engel. – Abstract 140

4:30 PM **Additional Forms of Victimization in Children Exposed to Violence**
Ruth Rubio, Paola Carugno, Rosemarie DiDonato, David H. Rubin. – Abstract 141

4:45 PM **Is Neurocognitive Function Associated with Youth Gambling Trajectories?**
Caitlin A. Brown, Hallam Hurt, Nancy L. Brodsky, Laura M. Betancourt, Kathleen A. McKenna, Joan M. Giannetta, Daniel Romer. – Abstract 142

5:00 PM **On-Line Survey of Feeding and Gastrointestinal Problems in Children with High Functioning Autism: Comparison with Their Normally Developing Siblings**
Vahe Badalyan, Richard H. Schwartz. – Abstract 143

5:15 PM **Accuracy of Pediatricians' Identification of Developmental and Behavioral Problems**
Shela Merchant, R. Christopher Sheldrick, Ellen C. Perrin. – Abstract 144

5:30 PM **A Needs Assessment of Health Care Professionals for a Violence Prevention Program at St. Christophers Hospital for Children**
Mario Cruz, Daniel Taylor, Aakanksha Mehta, Stephen Sandlich. – Abstract 145

Poster Session II

6:00 PM-7:30 PM **Symphony Ballroom**

1 **Window Fall Trauma in Children**
Alison B. McCrone, Kathleen A. Lillis, Ali Ebrahimi, William Grant. – Abstract 146

2 **Cervical Spine Injuries in Children: A 7-Year Review at St. Barnabas Hospital, Level 1 Trauma Center, Bronx, NY**
Sheryl Grace R. Kho, Wipanee Phupakdi. – Abstract 147

3 **The Tipping Point: Hidden Dangers of the Transition to Digital Television**
Katherine E. Nicholson, Lei Chen. – Abstract 148

4 **Interrater Reliability of the Clinical Examination in Pediatric Soft Tissue Infections**
Jennifer R. Marin, Warren B. Bilker, Ebbing Lautenbach, Elizabeth R. Alpern. – Abstract 149

5 **Capnography Improves Recognition of Endotracheal Tube Dislodgement by Prehospital Providers**
Melissa L. Langhan, Kevin Ching, Payal Kadia, Michelle Alletag, Lei Chen. – Abstract 150

6 **Pediatric Residents' Competencies in the Care of Surgical Patients: A Needs Assessment**
Anna M. Carr, Matilde Irigoyen. – Abstract 151

7 **Pediatric Resident Experiences Coping with Stress during Residency Training**
Paula Max-Wright, David Harness, Alison J. Falck. – Abstract 152

8 **The Perception of Pediatric House Staff and Attendings on the Necessity of Specific Resuscitation Skills**
Alison Gurtman, Daniel Fein, Sadiqa Edmonds-Myles, Kathryn Scharbach, Jacqueline Weingarten-Arams. – Abstract 153

9 **High Fidelity Simulation Improves Neonatal Procedural Skills and Team Behaviors**
Jesse Bender, Robin Shields, Karen Kennally. – Abstract 154

10 **Mycoplasma Pneumonia Increases Symptom Severity in Children with Status Asthmaticus**
Mimily Harsono, Won Baik-Han, Partha Chatterjee, Susana Rapaport, Rusly Harsono. – Abstract 155

11 **The Association between Disease Beliefs and Indoor Environmental Control Practices among Children with Asthma**
Angkana Roy, Lauren Steele, Juan Wisnivesky. – Abstract 156

12 **Demonstration of Metered-Dose Inhaler and Spacer with Mouthpiece Administration Technique by Pediatric Asthma Patients**
Patricia Visbal Edmondson, Rusly Harsono. – Abstract 157

13 **Novel Mutation in the SKT10 Gene Causing a Clinical Syndrome Associated with Juvenile Polyps and Tubular Adenoma**
Patricia Galvin-Parton, Lowenheim Mark, Weiss Jody. – Abstract 158

14 **An Association of Vitamin D Deficiency and Anemia in the Pediatric Population**
Amna Waraich, Ashok Valluri, Dominick Sabatino, Stephen P. Katz. – Abstract 159

15 **Quantity or Quality: What Controls the Decision To Pause/Stop a NICU Bottle Feeding?**
M. Kathleen Philbin, Barbara Medoff-Cooper, Teesha Thomas, Soraya Abbasi. – Abstract 160

16 **Superior Mesenteric Artery Blood Flow Velocity: Relationship to Increasing Gestational and Post-Natal Age**
Alecia M. Thompson, Cicero T. Silva, A. Semih Gork, Richard A. Ehrenkranz. – Abstract 161

17 **Meconium Interferes with NIRS Measurements of the GI Tract in Premature Neonates**
Alecia M. Thompson, Richard A. Ehrenkranz, Paul Benni. – Abstract 162

18 **Lack of Correlation of Nutritional Outcomes at 1 Year of Age with Bronchopulmonary Dysplasia (BPD) Severity in Premature Infants**
Nathan Demars, Amanda McGeachey, Jaclyn Davis, Vincent Smith, Lawrence Rhein. – Abstract 163

19 **Non-Invasive Arm Anthropometry Accurately Estimates Body Composition in Low Birth Weight Infants (Birth Weight <2500g, LBW)**
Rita P. Verma, Penny London. – Abstract 164

20 **Neonatal Nursing Perceptions of Breastfeeding Support in the NICU**
Vera J. Burton, Allison Falck. – Abstract 165

21 **Treatment of Asymptomatic Full Term Newborns for Presumptive Early Sepsis**
Tatyana Gabinsky, Aneela Bidiwala, Simona Proteasa, Melvin Gertner. – Abstract 166

22 **Birth Hyperoxia Alters Lung Levels of T-Lymphocytes in Gram-Negative-Infected Sprague-Dawley Rat Pups**
Angeline Seah, J. Craig Cohen, Shetal Shah. – Abstract 167

23 **Duration of Maternal Human Papillomavirus Infection and Risk of Spontaneous Preterm Birth**
Komal S. Soin, Neil S. Seligman, Aisha Nnoli, Jason K. Baxter, Kevin Dysart. – Abstract 168

24 **Can the Ribosomal RNA (rRNA) Gene PCR Improve the Diagnosis of Bacterial Meningitis in Children? A Systematic Review**
Lakshmi Srinivasan, Jared Pisapia, Samir S. Shah, Casey Halpern, Mary C. Harris. – Abstract 169

25 **Differentiating between Methicillin Resisistant (MRSA) and Methicillin Sensitive (MSSA) Staphyllococcus Aureus Wound Infections in Children Based on Initial Presentation**
Almas Patanker, Ashok Valluri, Jacob J. Rosenberg, Stephen P. Katz. – Abstract 170

26 **The Graseby Capsule: A New Look at Old Technology**
Debra J. Stern, Sherry E. Courtney, Michael D. Weisner. – Abstract 171

27 **The Role of Pulmonary Follow-Up in Reducing Respiratory Rehospitalizations of Premature Infants**
Liza Konnikova, Amanda McGeachey, Jaclyn Davis, Lawrence Rhein. – Abstract 172

28 **Late Preterm Infants: Defining Criteria for Admission to Newborn Nursery**
Mallula Kiran, Matam Ramesh, Shakir Taaha, Salvador Agnes. – Abstract 173

29 **Expression of Caveolin-1 in Infants with Pulmonary Hypertension and Congenital Heart Defect**
Narendra R. Dereddy, Jing Huang, John H. Wolk, Markus Erb, Michael H. Gewitz, Rajamma Mathew. – Abstract 174

30 ***It's Not What She Knows, It's How Well She Knows It!* The Hidden Problem in Perinatal Health Care**
D. Chhabra, J. Joymon, E. Baldyga, M. Mercado, C. Hunter-Grant, E.F. LaGamma, H.L. Brumberg. – Abstract 175

31 **Regulation of Age-Dependent Type II Cell EMT Behavior**
O. Guengoeze, C. Scapin, E. Pringa, A. Ritzkat, H.C. Nielsen, C.E.L. Dammann. – Abstract 176

32 **Pulmonary Hypertension Secondary to CLD: A Cautionary Tale**
Venkata S. Majjiga, Divya Chhabra, Lance Parton, Edmund F. LaGamma, Boriana Parvez. – Abstract 177

33 **Type and Timing of Ventilation in the First Postnatal Week Determines the Outcome of Bronchopulmonary Dysplasia (BPD)/Death**
Vikramaditya Dumpa, Veronika Northrup, Vineet Bhandari. – Abstract 178

34 **Androgen Inhibits TACE-Mediated Components of Fetal Type II Cell Surfactant Synthesis**
Lucia D. Pham, Sana Mujahid, Sandy Murray, MaryAnn V. Volpe, Heber C. Nielsen. – Abstract 179

35 **Nasal Intermittent Positive Pressure Ventilation (NIPPV) Does Not Facilitate Earlier Extubation in Infants Less Than 28 Weeks Gestation: A Pilot Study**
Olga A. DeSimone, Ross Sommers, Kisha Destin, Martha Mance, Sherry Matook, Barbara Stonestreet, Abbot Laptook. – Abstract 180

36 **Does Bubble CPAP Enhance Carbon Dioxide Elimination Compared to Ventilator-Generated CPAP?**
Pankaj Nagaraj, Kabir M. Abubakar, Martin Keszler. – Abstract 181

37 **Is Exhaled Nitric Oxide (FE_{NO}) Useful in BPD?**
Johanna M. Calo, Joseph Boyer, Lance A. Parton. – Abstract 182

38 **Does Early Onset of Necrotizing Enterocolitis Increase the Risk of Recurrent NEC?**
Rubia Khalak, Jennifer Cerone, Upender Munshi. – Abstract 183

39 **Patterns of Flow at Children's Hospital**
Meera Ragavan, Bhuvaneswari Jayaraman, Evan Fieldston. – Abstract 184

40 **Telephone Triaging and Pediatric Residents: Where Are We?**
Sri S. Chinta, Natalia Isaza, Gunce Karaman, Teena Sebastian, Matilde Irigoyen. – Abstract 185

41 **Bottled or Tap Water: What Are Parents and Children Drinking?**
Lina Huerta, Matilde Irigoyen. – Abstract 186

42 **Parental Attitudes and Experience with Infant Swaddling in an Inner City Population**
Barbara A. Kelly, Matilde Irigoyen, Monique M. Mondesir, Tina Harralson. – Abstract 187

43 **The Role of Qualitative Methods in Improving Breastfeeding Support in Pediatric Practices**
Celia L. Quinn, Natalie Langston-Davis. – Abstract 188

44 **Easier Said Than Done: HIV Screening in Pediatric Primary Care**
Neil Rellosa, Krishna White, Benjamin Fogel, Carly Levy, Abigail F. Freedman. – Abstract 189

45 **Infant Formulas 2010: Claims and Clinical Evidence**
Peter F. Belamarich, Andrew D. Racine. – Abstract 190

46 **Assessment of Quality of Care in Adolescent Males in an Inner City Setting**
Luis A. Umana, Paulo R. Pina. – Abstract 191

47 **Perception and Attitude of Caregivers toward Pain and Anxiety Associated with Pediatric Vaccine Injection**
KeriAnne B. Brady, Hnin Khine, Swapnil N. Rajpathak, Jeffrey R. Avner. – Abstract 192

48 **Twenty Years of Ethics Consults in a Pediatric Hospital**
Sandra G. Hassink, Roopa Chari, Iman Sharif. – Abstract 193

Sunday, March 28, 2010

Plenary Session III & Presentation of The Young Investigator Awards

8:30AM-9:30AM **Overture**

8:30AM **Presentation of The Young Investigator Awards**

8:40AM **Plenary Lecture - Developmental Mechanisms of Cardiovascular Disease**
Jon Epstein, MD, University of Pennsylvania, Philadelphia, PA

Neonatology - Clinical Studies II Platform Session

9:45 AM-12:00 PM **Concerto**

Moderators: Vineet Bhandari, MD & Joseph DeCristofaro, MD

9:45 AM **Effects of Supplemental Thyroid Hormone on Heart Rate and Blood Pressure in Extremely Low Gestational Age Neonates (ELGANs): THOP1 Trial**
Edmund F. LaGamma, Shawn Gulati, Aleid G. vanWassenaer, Susana Ares, Joke H. Kok, Jose Quero, Gabriella Morreale de Escobar, Sergio G. Golombek, Ting Hong, Mohammad H. Rahbar, Delbert A. Fisher, Nigel Paneth. – Abstract 194

10:00 AM **Sirtuin1 in Tracheal Aspirate Leucocytes: Possible Role in the Development of Bronchopulmonary Dysplasia in Premature Infants**
Kartik Mody, Judy G. Saslow, Suganya Kathiravan, Riva Eydelman, Vishwanath Bhat, Gary Stahl, Sulaiman Sannoh, Kee H. Pyon, Charles Hewitt, Vineet Bhandari, Zubair H. Aghai. – Abstract 195

10:15 AM **Blood Lactate Levels in Potential ECMO Candidates with Persistent Pulmonary Hypertension of the Newborn (PPHN)**
Ashaki M. Brown, Kabir M. Abubakar, Jennifer Berg, Margaret Rodan, Martin Keszler. – Abstract 196

10:30 AM **Survival without ECMO in Neonatal Hypoxemic Respiratory Failure (HRF) Is Associated with Lower Oxygenation Index (OI) and Higher Peak Methhemoglobin (MHb) Level**
Shaon Sengupta, Chang Xing Ma, Rita M. Ryan, Satyan Lakshminrusimha. – Abstract 197

10:45 AM **Risk Factors for Necrotizing Enterocolitis Totalis**
Alecia M. Thompson, R. Lawrence Moss, Matthew J. Bizzarro, Karen Diefenbach, Joyce Simpson, Richard A. Ehrenkranz. – Abstract 198

11:00 AM **Pilot Study of Antibiotic Usage across Four NICUs for Early and Late Onset Sepsis**
Haritha Vellanki, Sameer J. Patel, Theoklis Zaoutis, Pamela Douglas-Fontello, Luis Alba, David A. Paul, Lisa Saiman. – Abstract 199

11:15 AM **Decrease in Percutaneous Catheter Infection after Nosocomial Infection Control Measures in Level 3 NICU**
Sulaiman Sannoh, Linda Wicker, Vishwanath Bhat, Zubair Aghai, Kee Pyon, Nicole Kemble, Judy Saslow, Sonia Imaizumi, Gary Stahl. – Abstract 200

11:30 AM **Feeding Difficulties in Infants with Hypoxic Ischemic Encephalopathy (HIE) Treated with Selective Head Cooling (SHC)**
Erlita Gadin, Susan Adeniyi-Jones, Shobhana Desai. – Abstract 201

11:45 AM **Are Temporal Artery and Axillary Temperatures Accurate for Clinical Decision-Making in the Well Baby Nursery?**
Michael Bruno, Amy Mackley, John Stefano, Robert Locke. – Abstract 202

Neonatology - Pulmonary Injury Platform Session

9:45 AM-12:00 PM **Overture**

Moderator: Vasanth Kumar, MD

9:45 AM **Hyperoxia Induced NFκB Activation Alters the Expression of Rev-ERBα and Differentiation of Mouse Lung Fibroblasts**
Maurice D. Hinson, Guang Yang, Ping La, Clyde A. Wright, Phyllis A. Dennery. – Abstract 203

10:00 AM **Nitric Oxide Inhibits NF-κB Regulated Adhesion Molecule Expression in Human Neonatal Pulmonary Endothelial Cells Exposed to Hyperoxia**
Fadeke Agboke, Amal P. Fernando, Ping La, Guang Yang, Phyllis A. Dennery, Clyde J. Wright. – Abstract 204

10:15 AM **Neonatal Hyperoxia Increases Leukotriene B_4 (LTB_4) Production in Room Air Recovered Adult Mice**
Vasanth H. Kumar, Serguei V. Kishkurno, Lori Nielsen, Huamei Wang, Rita M. Ryan. – Abstract 205

10:30 AM **Heme Oxygenase-1 Is Important in Lung Recovery after Neonatal Mice Exposed to Hyperoxia**
Guang Yang, Tiangang Zhuang, Phyllis A. Dennery, Qing Lin. – Abstract 206

10:45 AM **Biphasic Pattern of Inflammatory Response in Neonatal Mice Exposed to Inhaled LPS**
Ogechukwu R. Menkiti, Huayan Zhang, Honghong Sun, Junjei Mei, Yuhong Liu, George S. Worthen. – Abstract 207

11:00 AM **Duration of Birth Hyperoxia Alters Levels of T-Lymphocytes in the Lungs of Month-Old Sprague-Dawley Rats**
Angeline Seah, J. Craig Cohen, Shetal Shah. – Abstract 208

11:15 AM **CXCL5 Regulate Chemokine Scavenging and Pulmonary Host Defense to Bacterial Infection**
Junjie Mei, Yuhong Liu, Michael Favara, Ning Dai, Samithamby Jeyaseelan, Janet S. Lee, G. Scott Worthen. – Abstract 209

11:30 AM **The Effects of Hyperoxia and Lipo-Poly Saccaride (LPS) on Inflammatory Mediators in the Lungs of Sprague-Dawley Rat Pups**
Elizabeth Buescher, J. Craig Cohen, Shetal Shah. – Abstract 210

11:45 AM **Alveolarization and Cytokine Responses Are Altered in Adult Mice Exposed to Neonatal Hyperoxia**
Serguei V. Kishkurno, Rita M. Ryan, Lori Nielsen, Huamei Wang, Vasanth H. Kumar. – Abstract 211

Pulmonary & Asthma Platform Session

9:45 AM-12:00 PM **Aria A**

Moderator: Rusly Harsono, MD

9:45 AM **Transient Disruption of Stretch-Dependent Lung Organogenesis Leads to Altered Postnatal miRNA and Fibrotic Lung Disease Phenotype**
Anja Mowes, Erin Killeen, Kirstie Marcello, Craig Cohen, Janet Larson. – Abstract 212

10:00 AM **Adult Onset Airway Disease Following Transient Disruption of Fetal Stretch-Induced Differentiation**
Kirstie R. Marcello, Erin Killeen, Anja Mowes, Craig Cohen, Janet Larson. – Abstract 213

10:15 AM **Using Exercise To Improve Clinical Outcomes in Cystic Fibrosis**
Laura A. Barnes, Kathryn A. Carson, Karen von Berg, Holly Loosen, Shruti M. Paranjape. – Abstract 214

10:30 AM **A Comparison of Physical Activity Levels between Asthmatic and Non-Asthmatic Inner City Children**
Nita Vangeepuram, Susan L. Teitelbaum, Maida Galvez, Barbara Brenner, John Doucette, Mary S. Wolff. – Abstract 215

10:45 AM **Racemic Albuterol or Levalbuterol, Continuous or Very-Frequent-Intermittent Nebulizations: A Prospective, Randomized Controlled Study in Children with Status Asthmaticus**
Mimily Harsono, Partha Chatterjee, Won Baik-Han, Susana Rapaport, Rusly Harsono. – Abstract 216

11:00 AM **Macrolide Treatment in Children with Status Asthmaticus: Antimicrobial or Anti-Inflammatory?**
Mimily Harsono, Partha Chatterjee, Won Baik-Han, Susana Rapaport, Rusly Harsono. – Abstract 217

11:15 AM **Breathing Easy: The Economic Implications of Outdoor Air Pollution and Pediatric Asthma Hospitalizations**
Angkana Roy, Perry Sheffield, Kendrew Wong, Leonardo Trasande. – Abstract 218

11:30 AM **The Association between Asthma Education and Use of Environmental Control Practices**
Angkana Roy, Lauren Steele, Emily Blanchard, Atray Dixit, Juan Wisnivesky. – Abstract 219

11:45 AM **Psychosocial Stress and Asthma: The Role of Neighborhood Safety**
Nita Vangeepuram, Maida Galvez, Barbara Brenner, John Doucette, Mary S. Wolff. – Abstract 220

General Pediatrics III - Medical Education Platform Session

9:45 AM-12:00 PM **Maestro B**

Moderator: David Rappaport, MD

9:45 AM **Could Physician Education and Application of Pharmacokinetic Principles Improve Serum Gentamicin Levels in Neonates?**
Fadel Balawi, Katherine Han, Gladys El-Chaar, Susana Castro-Alcaraz. – Abstract 221

10:00 AM **Post-Simulation Debriefing Is Crucial to Residents' Disaster Triage Performance and Patient Outcomes**
Mark X. Cicero, Jason Zigmont, Marc Auerbach, Kevin Ching, Carl R. Baum. – Abstract 222

10:15 AM **Impact of Implementing Family Centered Rounds (FCR) in a Neonatal Intensive Care Unit**
Kristin C. Voos, Anne-Lise Yohay, Gail Ross, Mary J. Ward, S. Nena Osorio, Jeffrey M. Perlman. – Abstract 223

10:30 AM **Satisfaction with Family-Centered Rounds: Perspectives of Families, Nurses, Trainees, and Attending Physicians**
David I. Rappaport, Tara A. Ketterer, Vahideh Nilforoshan, Iman Sharif. – Abstract 224

10:45 AM **Impact of an Evidence-Based Medicine Curriculum on Residents' Medical Literature Use**
Kathryn Scharbach, Philip O. Ozuah. – Abstract 225

11:00 AM **A Novel Approach to Residents' Scholarly Activities (RRC Requirement IV B)**
Fernanda E. Kupferman, Rusly Harsono, David DiJohn, Lily Lew, Louis Primavera, Susana Rapaport. – Abstract 226

11:15 AM **Pediatric Resident Knowledge of Sport-Related Concussion**
Katherine E. Nicholson, Lei Chen. – Abstract 227

11:30 AM **New Interns Have Little Training or Confidence in Their Pediatric IV Skills**
Payal Kadia, David Kessler, Eric Weinberg, Chris Strother, Julie Lindower, Joshua Rocker, Laura Haubner, Matei Patrescu, Lindsey Tilt, Gunjan Kamdar, Grace Artaega, Marc Auerbach. – Abstract 228

11:45 AM **A Multi-Center Study of Infant Lumbar Puncture during Medical School**
David Kessler, Eric Weinberg, Chris Strother, Julie Lindower, Joshua Rocker, Laura Haubner, Grace Arteaga, Matei Petrescu, Lindsey Tilt, Gunjan Kamdar, Michael Miller, Jessica Foltin, Marc Auerbach. – Abstract 229

Emergency Medicine Platform Session

9:45 AM-12:00 PM **Maestro A**

Moderator: Sharon Smith, MD

9:45 AM **Ultrasound Evaluation of Skull Fractures in Children**
Antonio Riera, Lei Chen. – Abstract 230

10:00 AM **To CT or Not CT: Neurologic Complaints in Young Children Presenting to the Emergency Department**
Rebecca S. Kriss, Karen R. Carpenter, Karin B. Nelson, Tarannum M. Lateef. – Abstract 231

10:15 AM **The Association of Weight Percentile and Motor Vehicle Crash Injury among 3 to 8 Year Old Children**
Mark R. Zonfrillo, Kyle A. Nelson, Michael J. Kallan, Dennis R. Durbin. – Abstract 232

10:30 AM **Impact of the CARES Psychiatric Assessment Unit on Patient Management in the Emergency Department**
Lauren C. Griffin, Peter D. Masso, Lynn Mangini, Michael Stevens, Sharon R. Smith. – Abstract 233

10:45 AM **2009 Swine Flu Epidemic and Pediatric Emergency Services; What Have We Learned?**
David Listman, Jeffrey Chen, Rosemary Didonato, Elliot Schottland, David Perlstein, David H. Rubin. – Abstract 234

11:00 AM **Patient Satisfaction in a Pediatric Emergency Department (ED): What Really Matters?**
Anita Roy, Jobayer Hossain, Alex Koster, Mariane Stefano, Kay Holbrook, Magdy Attia, Jay Greenspan. – Abstract 235

11:15 AM **Detection of Hypoventilation by Capnography and Its Assosciation with Hypoxia in Children Undergoing Sedation with Ketamine**
Melissa L. Langhan, Lei Chen, Clement Marshall, Karen A. Santucci. – Abstract 236

11:30 AM **Impact of an Economic Disaster on Access to Child Healthcare and Utilization of the Pediatric Emergency Department**
Mark X. Cicero, Veronika Northrup, Fangyong Li, Karen Santucci. – Abstract 237

11:45 AM **Decreasing Unplanned Return Visits in Children with Fever in the Emergency Department**
Amy L. Dunn, Josh Palmbech, Sharon R. Smith. – Abstract 238

GI / Nutrition / Hematology - Oncology Platform Session

9:45 AM-12:00 PM **Minuet**

Moderator: Mitchell Cairo, MD

9:45 AM **Detection of Pepsin in Mouth Swab, a Noninvasive Method of Detecting Gastroesophageal Reflux in Preterm Infants**
Sabeena Farhath, Judy G. Saslow, Sam Sounder, Zhoping He, Barbara Amendolia, Sulaiman Sannoh, Vishwanath Bhat, Kee H. Pyon, Gary E. Stahl, Dev Mehta, Zubair H. Aghai. – Abstract 239

10:00 AM **Using Near Infrared Spectroscopy (NIRS) To Measure Bowel Motility in Preterm Infants**
Mariam Said, Nickie Niforatos, Khodayar Rais-Bahrami. – Abstract 240

10:15 AM **Effect of Antenatal Erythromycin in Establishing Feeding in Preterm Neonates**
Venkata S. Majjiga, James Smith, Boriana Parvez. – Abstract 241

10:30 AM **Percentage of Endothelial Progenitor Cells (EPC) in Human Umbilical Cord Blood of Preterm and Term Newborns**
Ranjan Monga, Nitin Chouthai, Steven Buck, Priyankar Sharma, Saiprasad Gopal. – Abstract 242

10:45 AM **Role of Apoptosis in the Progression of Hematopoietic Abnormalities in Noonan Syndrome**
Kimihiko Oishi, Andres Hidalgo, In-Kyong Kim, Paul S. Frenette, Bruce D. Gelb. – Abstract 243

11:00 AM **Inflammatory Responses to Long-Chain Polyunsaturated Fatty Acids (PUFA) in Neonatal Neutrophils**
A.M. Vetrano, F.E. Archer, D.L. Laskin, B. Weinberger. – Abstract 244

11:15 AM **$CD34^+$ Stem Cell Selection and $CD3^+$ Addback for Matched Unrelated Donor (MUD) Peripheral Blood Stem Cell Transplantation (PBSCT) in Pediatric Recipients**
Mark B. Geyer, Judith S. Jacobson, Lauren Harrison, Joseph Schwartz, Mitchell S. Cairo. – Abstract 245

11:30 AM **Immune Reconstitution (IR) and Acute GVHD (aGVHD) Following Myeloablative (MAC) or Reduced Toxicity Conditioning (RTC) Prior to Unrelated Cord Blood Transplantation (UCBT) in Pediatric Recipients**
Mark B. Geyer, Judith S. Jacobson, Jason Freedman, Diane George, Mitchell S. Cairo. – Abstract 246

11:45 AM **Duration of Mechanical Ventilation in Critically Ill Children with Symptomatic Central Venous Line-Related Deep Venous Thrombosis**
E. Vincent S. Faustino, Karla Lawson, Renee A. Higgerson. – Abstract 247



2010 ESPR Abstracts

Poster Session I

Friday, March 26, 2010
6:00 PM-7:30 PM

1

The Disparity in Preterm Birth for African American Mothers in the Context of Maternal Morbidities

Erika F. Dennis, Corinne Fager, Scott A. Lorch.
Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: The disparity in birth outcomes for African American women is well documented. Many studies have controlled for maternal disease in the attempt to explain disparate birth outcomes. The degree to which this disparity persists within disease specific populations is not well researched.

OBJECTIVE: To compare disparities in preterm birth (<37 weeks gestation) between all women and women with one of six pregnancy complications.

DESIGN/METHODS: Using linked birth certificate data and infant and maternal discharge summaries from all women delivering in Missouri, California, and Pennsylvania between 2001-2003 (N=1,812,938), we constructed separate logistic regression models among all women and among women with hypertensive disorders, diabetes, infectious diseases, oligohydramnios, premature rupture of membranes (PROM), and placental abnormalities. In the models we controlled for race, age, initiation of prenatal care, year, insurance, parity, maternal and paternal education, treatment hospital, and medical problems.

RESULTS: African American mothers were more likely to have at least one medical problem (41.6%) compared to other races (32.1%), and more likely to have more than one medical problem (10.7%) relative to other races (6.2%). In our population wide regression model we obtained an adjusted OR for preterm birth in African American mothers of 1.26 (1.23-1.29) relative to Whites. In our disease specific models there was no statistically significant difference in the odds of preterm birth for African American mothers with hypertensive disorders (OR 1.06, 95% 0.98-1.13) and oligohydramnios (OR 1.08, 95% CI 0.93-1.22). African American mothers with diabetes (OR 1.25, 95% CI 1.13-1.36), PROM (OR 1.22, 95% CI 1.11-1.32) and infections (OR1.23, 95% CI 1.16-1.30) had similar rates to our baseline analysis. Mothers with placental abnormalities (OR 1.17, 95% CI 1.02-1.33) showed a modest decrease in the likelihood of preterm birth relative to the general population.

CONCLUSIONS: African American women are more likely to suffer from multiple medical complications during pregnancy. The cumulative impact of multiple medical conditions in addition to sociodemographic and environmental factors may be a major contributor to the well described disparity in preterm birth. In women with hypertensive disorders and oligohydramnios the disparate rates of preterm birth can be completely explained by sociodemographics, treatment hospital, and other comorbidities.

2

Predictors of Low Weight (Less Than 10%) at 12 Months Corrected Age in NICU Graduates

Jordan S. Kase.
Division of Newborn Medicine, Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: Some infants are born preterm or require NICU admission due to in utero weight <10% for gestational age(GA). Many NICU patients grow poorly due to high metabolic demands of a sick infant. However, catch-up growth often occurs after NICU discharge.

OBJECTIVE: To identify factors associated with and potential predictors of poor catch-up growth in former NICU patients at 12 months(m) corrected age(CA).

DESIGN/METHODS: Subjects are former NICU patients evaluated at a NICU follow-up(f/u) program at 12m CA±2m. Associations were established for antenatal factors with small for GA(SGA) infants, and antenatal or neonatal factors with weight <10% at 12m(Lo12) for both SGA and normal birthweight(Nbwt) infants. χ^2 analysis compared categorical variables and t-test compared continuous variables presented as mean±SEM. P<0.05 is statistically significant.

RESULTS: *693* patients were evaluated at 12 months CA. *8.9%* were SGA. By the 1st f/u exam, *13%* had weight <10%(Lo1st). *22.8%* were Lo12. Significant antenatal/fetal correlations with SGA were: medically indicated delivery (MI) v spontaneous birth (SB) *15 v 2%*; preeclampsia *21 v 7%*; meconium noted at delivery *26 v 9%*; congenital heart disease (CHD) *19 v 9%*; urogenital (GU) anomalies *21 v 9%*; birth length (BL) <10% *64 v 5%*; birth head circumference (BHC) <10% *44 v 3%*; GA *33.6±0.6 v 32.4±0.2* weeks. *52%* of SGA patients were Lo12. They were significantly more likely to: be born due to a MI cause than SB *9.3 v 0.6%*; be Lo1st *24 v 2%*; *have*: a low BL *38 v 2%*, and BHC *22 v 2%*; BPD *11 v 4%*; received post-natal steroids *25 v 4%*; CHD *11 v 4%*; ROP *16 v 4%* and laser therapy *21 v 4%*; GU anomalies *16 v 4%*; surgery in the 1st year *8 v 3%*; GI abnormality *10 v 3%*; and more CPAP days(d) *8.5±2.6 v 4.7±0.4d.* Patients who were Nbwt and Lo12 were significantly more likely to be: singletons than multiples *19 v 10%*; Lo1st *43 v 14%*; *have*: 5 minute APGAR≤3 *42 v 17%*; BPD *27 v 16%*; ROP *34 v 16%*; endocrine issues *33 v 17%*; neurologic issues *29 v 15%*; genetic or congenital malformations *41 v 16%*; surgery in 1st year *25 v 15%*; longer length of stay *47.6±5.2 v 36±1.9d*; more ventilator d *8.6±1.8 v 3.9±0.6d*; and nasal cannula d *14±3.2 v 8.1±1.2d.*

CONCLUSIONS: Multiple antenatal and congenital complications influence in utero and future growth. For those children of Nbwt, morbidities in the newborn appear to most greatly influence whether that child will be Lo12. For both SGA and Nbwt children, poor catch-up growth is evident by their 1st exam and may help predict future issues with weight gain.

3 Fellow in Training

Differences in Hospital Outcomes of Grade 3 and 4 IVH in ELBW Neonates When Withdrawal of Care Is an Option?

Sabrina Malik, Edmund LaGamma, Boriana Parvez.
Pediatrics, Division of Newborn Medicine, Maria Fareri Childrens Hospital-NYMC, Valhalla, NY.

BACKGROUND: The severity of intraventricular hemorrhage (IVH) ranges from mild to severe, no effective preventative strategies exist and long term neurodevelopmental disabilities may be devastating. Extremely Low Birth Weight neonates (ELBW) are particularly vulnerable to developing IVH, but only a small number will have a severe bleed (Grade 3/4). The morbidities and mortality of Gr. 3 & 4 are usually not reported separately. As the mechanisms may differ, **we hypothesize** that Gr.3 & 4 IVH in ELBW will differ in terms of incidence, risk factors and short term outcomes.

OBJECTIVE: To review the separate, incidence, risk factors and short term outcomes of Gr. 3 & 4 IVH in ELBWs.

DESIGN/METHODS: Retrospective chart extraction of all ELBW with a HUS documented Gr. 3 or 4 IVH admitted to our Regional NICU from March 2004 to February 2009.

RESULTS: Among all admissions (3084) the incidence of Gr. 3 & 4 IVH was 1% and 1.5% respectively. 474 neonates were ELBW, with a survival of 72%. The incidence of Gr. 3 & 4 IVH in this group was 5.3% and 7% respectively. The gestational age and birth weight between ELBW with Gr 3 and 4 IVH were similar: 24 ± 2 wks (24; 23-28) v.s. 25 ± 2 wks (25; 22-30) and 718 ± 148 g (695; 530 -960) v.s.720 ± 141 (716; 530-960) respectively. [mean ± SD; median, range]. Mortality between the 2 IVH groups did not differ (40% vs 58%) but was higher than in all other ELBW (28%). The mortality in the Gr. 4 was secondary to active withdrawal of life support as opposed to the Gr. 3 where it was related to complications of prematurity. There was a trend of higher maternal (chorioamnionitis, PPROM, preeclampsia) and neonatal (sepsis, NEC, Apgar scores) risk factors in the group with Gr3 IVH. The VP shunt rates were similar between both groups (4% vs 6%). Further, the incidence of Gr. 3 and 4 IVH at our institution was lower than reported by NICHD (1997-2002) and VON (2005) in ELBW; for Gr. 3: 11% and 8% and for Gr. 4: 8.5% and 10% respectively.

CONCLUSIONS: Severe IVH is associated with a high mortality, however we differ in our approach to Gr.4 IVH by offering withdrawal of life support. We did not identify differences in the incidence, risk factors and short term outcomes between the ELBW with Gr. 3 & Gr. 4 IVH. Long term follow up of all survivors with severe IVH is being conducted to determine if there are any differences in the neurodevelopmental outcome.

4 Fellow in Training

Prognostic Factors for Mortality in Late-Onset Sepsis in VLBW Infants

Orly L. Levit, Veronika Northrup, Vineet Bhandari, Patrick G. Gallagher, Matthew J. Bizzarro.
Pediatrics, Yale University School of Medicine, New Haven, CT; Biostatistics Support Unit, Yale Center for Clinical Investigation, New Haven, CT.

BACKGROUND: Late-onset sepsis (> 3 days of life) in VLBW infants is associated with increased risk of morbidity and mortality.The risk of late-onset sepsis is inversely related to BW and gestational age (GA), but other factors also influence sepsis-related outcomes.

OBJECTIVE: To determine risk factors which predict death in VLBW neonates with late-onset sepsis.

DESIGN/METHODS: Data were collected from all VLBW infants admitted to the Yale Newborn Special Care Unit from 1/1989 to 12/2007 with at least one episode of blood culture-proven late-onset sepsis. Episodes of sepsis were categorized as Gram-positive, Gram-negative and fungal. Data collection included demographics, clinical features, laboratory information and outcome. Multivariable logistic regression analysis was employed to compare and contrast different types of infections to determine differences in risk factors and outcome.

RESULTS: There were 290 (60.8%) children with Gram-positive, 139 (29.1%) with Gram-negative, and 48 (10.1%) with fungal infections. Mean GA and BW was significantly lower among children with fungal (25.4 weeks, 763.5 g) vs Gram-positive (26.6 weeks, 854.9 g) vs Gram-negative (26.8 weeks, 927.6 g) infections (p<0.017). There was a greater proportion of death due to sepsis among Gram-negative(22.3%, p<0.0001) or fungal infections (27.1%, p<0.0001), as compared with Gram-positive infections (4.1%). The difference between Gram-negative and fungal infections was not significant.(p=0.5). Having either Gram-negative or fungal infection was a significant independent predictor of elevated risk of death due to sepsis, even after adjusting for other risk factors. Other important predictors for death due to sepsis were BW (p=0.05), endotracheal intubation (p=0.009), days with a central line (p=0.0001), concurrent necrotizing enterocolitis (p=0.04) and length of stay (p=0.0001). Hypoglycemia (p=0.04), neutropenia (p=0.04) and thrombocytopenia (p=0.01) were significant presenting signs in neonates with sepsis-related death.

CONCLUSIONS: Late-onset Gram-negative and fungal infections in VLBW infants carries a high risk of death. We speculate that identification and modification of these risk factors may improve the prognosis in this devastating condition.

5

Gender-Specific Effects of Gestational Substance Exposure on Deep Gray Matter and Memory in Young Adults

Brian B. Avants, Laura M. Betancourt, Joan M. Giannetta, Hengyi Rao, Jiongjiong Wang, James C. Gee, Martha J. Farah, Hallam Hurt.

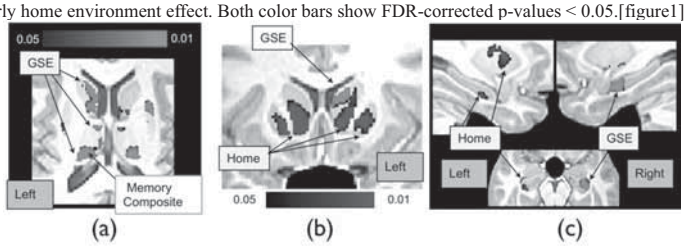
Radiology, University of Pennsylvania, Philadelphia, PA; Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA; Center for Cognitive Neuroscience, University of Pennsylvania, Phila, PA.

BACKGROUND: Animal and human studies suggest gender-specific neural effects of gestational substance exposure (GSE). Our prior work on GSE revealed volume differences in caudate that persist over time. Non-control members of this cohort were prenatally exposed to cigarettes, alcohol, marijuana and/or cocaine.

OBJECTIVE: We perform voxel-wise imaging analyses within the deep gray matter to determine whether GSE leads to gender-specific alterations in young adult brain development. For each gender, we relate the imaging measurements to memory composite scores assessed by neurocognitive testing.

DESIGN/METHODS: We use T1 3.0T MRI and publicly available, open-source template-based brain mapping (google: ANTS picsl) to estimate voxel-wise volumes of caudate nucleus, thalamus, putamen and hippocampus in socioeconomically matched young adults with and without GSE. All measures are taken relative to brain size in 83 subjects (49 female, 34 male) from the Hurt et al. cohort (average age: 17.4+/-1). We use voxel-wise ancova to isolate the effects of GSE, early home environment and age at time of scan.

RESULTS: Male thalamus, hippocampus and caudate nucleus volumes are significantly affected by GSE, with a non-overlapping sub-region of the striatum showing effects related to home environment at age 4. Volumes of GSE-related structures are significant predictors of memory composite scores in males, when early home environment and age are used as covariates. No significant results are found in females. Figure 1 panels (a) through (c) show the group-specific template where red areas are significantly affected by GSE in males and blue shows a significant early home environment effect. Both color bars show FDR-corrected p-values < 0.05.[figure1]



CONCLUSIONS: This study suggests: 1) greater sensitivity of male deep gray matter to GSE and early home environment than females; and 2) GSE is also related to reduced memory task scores in males, more than females.

6

Fellow in Training

Neonatal Hypoxic Ischemic Encephalopathy: Metabolic Predictors of Survival

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BACKGROUND: Hypoxic ischemic encephalopathy (HIE) occurs in 4 per 1000 live births with a mortality rate of up to 75%. Long term morbidity is improved with hypothermia treatment. In untreated HIE patients, predictors of outcome include perinatal factors, abnormal laboratory values, EEG and brain MRI. At TJUH all infants referred for hypothermia treatment are screened to exclude metabolic disease. In this population transient abnormalities are common. Few studies identify whether these metabolic parameters are associated with death in HIE infants.

OBJECTIVE: To determine whether metabolic parameters predict survival (mortality) in hypothermia treated HIE infants.

DESIGN/METHODS: A retrospective cohort of 155 infants with asphyxia who met the criteria and were treated with head or total body cooling were studied. A univariate analysis using Fisher's exact test was conducted to compare APGAR score at 10 minutes and serum lactate, AST, ALT, GGT, ammonia (NH_3), pyruvate and base deficit (BD) drawn within 48 hours of life in survivors vs non survivors. Abnormal lactate, NH_3, AST, ALT and GGT were defined as > 3 times upper limit of normal. BD >-20 and APGAR score ≤3 at 10 minutes were defined as abnormal.

RESULTS: This study included 155 infants, 20 of whom were non survivors. There was no difference in gestational age (39 wks±1.5), birthweight (3270g±524), gender (46% female) and APGAR score at one minute (1± 1.3) between survivors and non survivors. APGAR score at 5 minutes (3.2±2.1 vs. 1.9±2.4 P=0.02) was significantly different between survivors and non survivors respectively. APGAR score ≤ 3 at 10 minutes was associated with death (OR 4.8; 95% CI 1.6-14.3; P<0.01). Abnormal lactate, AST, NH_3, and BD were significantly associated with death.

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Metabolic Parameters Associated With Death

	Odds Ratio	95% CI	P value
BD (> - 20)	5.7	1.5-21.8	.02
Lactate (> 60 mg/dL)	16.3	2.1-125.1	<.001
AST (> 126 IU/L)	3.7	1.2-11.7	<.01
NH_3(> 105 mcmol/L)	5.3	1.9-15.1	<.01

GGT, ALT and pyruvate levels were not significant (data not shown).

CONCLUSIONS: Patients with abnormal lactate, AST, NH_3, BD and 10 minute APGAR score of ≤ 3 were more likely to die than those with normal levels. This data may help to guide health care providers with the prognosis and decision making process in caring for HIE infants. Further studies are needed to determine if these metabolic abnormalities are associated with long term morbidities among survivors of HIE.

7

Fellow in Training

Diffuse Correlative Spectroscopy (DCS) Enhances Neuromonitoring of Cerebral Hemodynamics in Postoperative Cardiac Patients during Blood Transfusions

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BACKGROUND: DCS is a novel optical modality, validated in neonatal and adult populations by various techniques, which allows bedside measurement of relative cerebral blood flow (rCBF). Combined with near infrared spectroscopy (NIRS), DCS can assess both rCBF and oxygenation changes during routine postoperative cardiac care. Cerebral hemoglobin difference (ΔHbD) and total hemoglobin concentration (ΔTHC) as measured by NIRS have been shown to correlate with measures of rCBF. These indirect estimations of rCBF may fail during certain postoperative interventions such as blood transfusions.

OBJECTIVE: To describe a novel bedside optical technique for continuously monitoring rCBF and oxygenation in postoperative cardiac patients focusing on the effects of blood transfusion on hemodynamics and potential limitation of indirect estimates of rCBF.

DESIGN/METHODS: This prospective observational study of continuous DCS/NIRS monitoring occurred in the cardiac intensive care unit (CICU) for 12 hours after neonatal heart surgery. Vital signs were continuously captured and time-locked with optical data. Blood transfusions were described by volume, infusion rate and time after surgery. Data were summarized with median (range) or mean +/-SD with paired t-tests used to compare pre-post data where appropriate. Pearson correlation coefficients were calculated with significance set at $p<0.05$.

RESULTS: Five neonates received 7 blood transfusions during the postoperative monitoring period. Median transfusion volume was 25 ml (15-60) given over 30 min (10-120min) at a median time of 51 min after surgery (5.8-517min). On transfusion completion, a significant increase was seen in mean arterial pressure (9.7mmHg +/- 9.4, p=0.05). NIRS measures of oxy- and deoxy-hemoglobin increased by a median of 4.4μM (-0.9-7.1μM) and 0.31μM (-6.6-18.7μM) respectively. Correlations between ΔTHC and rCBF as well as ΔHbD and rCBF did not achieve statistical significance (r =0.61, p=0.19; r = -0.39, p=0.44, respectively).

CONCLUSIONS: Postoperative cerebral hemodynamic monitoring is enhanced by DCS measurements which are insensitive to conditions that may alter the rCBF estimation based on hemoglobin concentrations measured by NIRS. Combining direct measurement of rCBF using DCS with NIRS will improve postoperative monitoring of cerebral physiology.

8

Fellow in Training

Mechanism of Phosphorylation of Bcl-2 during Hyperoxia in the Cerebral Cortex of Newborn Piglets

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BACKGROUND: Previously we have shown that hyperoxia results in up-regulation of pro-apoptotic protein Bax, without affecting the expression of anti-apoptotic protein Bcl-2 in the cerebral cortex of newborn piglets, thus increasing the ratio of pro/anti-apoptotic proteins in the neuronal cell. The ratio of proapoptotic to anti-apoptotic proteins determines the survival of neurons. Tyrosine phosphorylation of anti-apoptotic protein Bcl-2, however, results in loss of anti-apoptotic potential of protein.

OBJECTIVE: To investigate the mechanism of phosphorylation of anti-apoptotic proteins Bcl-2 during hyperoxia, we hypothesize that the hyperoxia-induced increased tyrosine phosphorylation of apoptotic protein, Bcl-2 is nitric oxide mediated.

DESIGN/METHODS: Piglets were divided in normoxic (Nx, n=5), hyperoxic (Hyx, n=5) and hyperoxic-pretreated with N-Nitro L-Arginine (Hyx+NNLA, n=5). Hyperoxic animals were exposed to FiO_2 of 1.0 for 2 hr and PaO_2 maintained above 400 mmHg while Nx group were kept at 80-100 mmHg. NNLA (40mg/kg, i.v.) was administered to piglets 30 min prior to hyperoxia. ATP and phosphocreatinine (PCr) levels were determined. Neuronal nuclei were isolated and proteins separated by 12% SDS-PAGE and probed with tyrosine phosphorylated Bcl-2 antibody. The protein bands were visualized with enhanced chemiluminescence, analyzed by imaging densitometry and band density expressed as absorbance (OD x mm^2).

RESULTS: ATP ($_{\mu}$moles/g brain) was 4.9±1.1 in the Nx, 5.1±0.5 in the Hyx (p=NS) and 4.6±0.9 in Hyx+NNLA (p=NS). PCr ($_{\mu}$moles/g brain) was 3.3±0.6 in Nx, 3.2±0.5 in Hyx group (p=NS) and 3.3±0.5 in Hyx+NNLA (p=NS). Density of Phosphorylated Bcl-2 was 82.37±3.72 in Nx, 183.36±11.93 in Hyx and 94.88±5.47 in Hyx+NNLA. The data show that administration of NNLA prior to hyperoxia decreased the phosphorylation of Bcl-2 in the neuronal nuclei of the cerebral cortex of newborn piglets.

CONCLUSIONS: We conclude that post-translational modification of anti-apoptotic protein Bcl-2 during hyperoxia is nitric oxide-mediated. We speculate that tyrosine phosphorylated Bcl-2 will not hererodimerize with Bax leading to increased activation of caspase-9 resulting in neuronal cell death. (Funded by NIH-HD-20337)

9 Fellow in Training

Mechanism of Caspase-3 Expression during Hyperoxia in the Cerebral Cortex of Newborn Piglets

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BACKGROUND: We have shown that hyperoxia results in increased expression and activity of caspase-3 in the cerebral cortex of newborn piglets. Hyperoxia also results in increased nitration of neuronal proteins due to generation of nitric oxide (NO). NO may alter the expression of caspase-3 by preventing the hyperoxia-induced increase in nuclear Ca^{++} influx and subsequent calcium calmodulin-dependent kinase IV (CaM kinase IV) mediated pathway of transcription through cyclic AMP response element binding protein (CREB) phosphorylation.

OBJECTIVE: The present study tests the hypothesis that the hyperoxia-induced increased expression of caspase-3 in the cytosolic fraction of the cerebral cortex of newborn piglets is mediated by NO derived from neuronal nitric oxide synthase (nNOS).

DESIGN/METHODS: Piglets were divided into: normoxic (Nx, n=3), hyperoxic (Hyx, n=3) and hyperoxic-treated with a highly selective nNOS inhibitor 7-nitro-indazole–sodium (Hyx+7-NINA, 1 mg/kg, i.v., 60 min prior to hyperoxia, n=2) groups. Hyperoxia was induced by exposure to an FiO_2 of 1 to maintain PaO_2 at >400 mmHg for 120 min. ATP and phosphocreaine (PCr) were determined biochemically to document cerebral tissue energy status. Cytosol was isolated. Expression of caspase-3 was determined by Western blot using a caspase-3 antibody and bands were detected by enhanced chemiluminescence. Band density was determined and expressed as absorbance (OD x mm^2).

RESULTS: Levels of ATP ($_{\mu}$moles/g brain) were 4.9±1.1 in Nx, 5.1±0.5 in Hyx, and 4.8±0.7 in Hyx+7-NINA (p=NS). PCr ($_{\mu}$moles/g brain) was 3.3±0.6 in Nx, 3.2±0.5 in Hyx, p=NS and 3.1±0.4 in Hyx+7-NINA (P=NS). Expression of caspase-3 was 54.52±3.87 in Nx, 112.70±9.11 in Hyx ($p<0.05$) and 63.82±8.49 in Hyx+7-NINA ($p<0.05$ vs Hyx). The data demonstrate that hyperoxia resulted in increased expression of caspase-3 in the cytosolic fraction of the cerebral cortex of newborn piglets and that the administatration of a highly selective nNOS inhibitor prevented the hyperoxia-induced increased expression of caspase-3.

CONCLUSIONS: We conclude that the hyperoxia-induced increased expression of caspase-3 in the cerebral cortex of newborn piglets is mediated by NO derived from nNOS. We speculate that NO free radicals generated during hyperoxia result in increased expression of caspase-3 through activation of CREB protein, a transcription factor that triggers expression of apoptotic proteins.

(Funded by NIH-HD 20337)

10 House Officer

Mechanism of Phosphorylation of Caspase-9 in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets Following Hyperoxia

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BACKGROUND: Studies have shown that Caspase-9 is one of the cysteine proteases that initiates programmed neuronal cell death in the brain. We have shown that hyperoxia results in an increased activation and expression of caspase-9 in the cytosolic fraction of cerebral cortex of newborn piglets. It is known that phosphorylation of proteins alter their function. Also previously we have shown that hyperoxia results in increased activation of neuronal nitric oxide synthase (nNOS) and generation of nitric oxide (NO) free radicals which can alter the phosphorylation of caspase-9 in the cerebral cortex of newborn piglets.

OBJECTIVE: The present study tests the hypothesis that hyperoxia induced increase in phosphorylation of caspase-9 at serine^{196} in the cytosolic fraction of the cerebral cortex of newborn piglets is mediated by nNOS derived NO.

DESIGN/METHODS: Eleven 3 day old piglets were divided into normoxic (Nx, n=4) hyperoxic (Hyx, n=4) and hyperoxic pretreated with 7-NINA, a highly selective nNOS inhibitor (Hyx + 7-NINA, n=3) groups. Hyperoxia was induced with FiO_2 of 1.0 for 2 hr, PO_2>400mm Hg. ATP and PCr levels were determined biochemically. The cytosolic proteins were separated by 12% SDS-PAGE and probed with anti-phosphorylated caspase-9 antibody (p-caspase-9, Ser^{196}) by Western blot analysis. Protein bands were analyzed by imaging densitometry and band density expressed as (OD x mm^2).

RESULTS: Levels of ATP (µmol/g brain) were 4.9±1.1 (Nx), 5.1±0.5 (Hyx), 4.8±0.7 (Hyx + 7-NINA), p=NS and levels of PCr (µmol/g brain) were 3.3±0.6 (Nx), 3.2±0.5 (Hyx), 3.1±0.4 (Hyx+7-NINA), p=NS. Phosphorylated caspase-9 protein expression was 18.85±0.66 in Nx and 51.15±1.48 in Hyx ($p<0.05$ vs Hyx) and 22.45±0.09 in Hyx + 7-NINA ($p<0.05$ vs Hyx). The data show increased serine phosphorylation of caspase-9 during hyperoxia. Administration of nNOS inhibitor 7-NINA prevented the hyperoxia induced increase in p-caspase-9 and levels were comparable to Nx.

CONCLUSIONS: We conclude that the mechanism of increased phosphorylation of caspase-9 at Ser^{196} site during hyperoxia is mediated by nNOS derived nitric oxide. We speculate that nitric oxide generated during hyperoxia leads to inactivation of serine phosphatases leading to a shift in the phosphorylation/dephosphorylation equilibrium in favor of increased phosphorylation of caspase-9 at Ser^{196}.

(Funded by NIH-HD 20337)

11

Effect of Continuous Glucose Monitoring (CGM) on Quality of Life, HbA1C, Fasting Blood Glucose and the Variability of Blood Glucose Reading in Children with Type 1 Diabetes Mellitus

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BACKGROUND: In youths with Type 1 Diabetes strict diabetes control is difficult to achieve and can often result in greater risk of severe hypoglycemia. Continuous glucose monitoring is helpful in detecting hypoglycemia and postprandial hyperglycemia, a risk factor for cardiovascular complications. As a life long disease it is important to make the self- management and self-monitoring of blood glucose as easy and efficient as possible. The goal of CGM is to achieve optimal metabolic control, while improving the quality of life.

OBJECTIVE: To evaluate the extent of patient satisfaction in using CGM as an effective tool for maintaining tight glycemic control and improving the quality of life of children and adolescents with Type1 Diabetes.

DESIGN/METHODS: In this retrospective study, a questionnaire concerning satisfaction of CGM use was sent to 75 patients 3-25 years of age who were using CGM. A total of 21 responded to the self reported questionnaire.

RESULTS: Among the 21 respondents (age 4-24 years), 17 (81%) were satisfied with CGM, 15(71%) believed that CGM changed their lifestyle, 10 (48%) reported decrease in HbA1C and 3(14%) reported stable HbA1C. (Mean diabetes duration was 7.5 years). The main reasons for satisfaction included: fewer finger sticks, ability to see trends, ability to detect unexpected highs and lows, better blood glucose control, feeling safe, good night time safeguard, more independence with self management and good control of HbA1C. The main reasons for dissatisfaction included: pain on insertion, wearing another device, difficulty setting up the device, minor scaring, and not always reliable or accurate. Being more confident, having less concern over lows, less frequent testing, easier diabetes management, having more sense of security and being able to sleep better were reported as life style changes with the use of CGM.

CONCLUSIONS: The high level of patient satisfaction demonstrates that implementing CGM into the treatment plan of pediatric patients with Type 1 Diabetes may prove to be an effective and worthwhile decision to maintain and improve their lifestyle and glycemic control.

12 Fellow in Training

Short Term Treatment with Anastrozole Does Not Affect Bone Strength in Pubertal Boys with Short Stature

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BACKGROUND: Aromatase inhibitors (AI) have been used to delay bone maturation in boys to improve adult height. In growth hormone-treated adolescents, anastrozole (AN)treatment for 3 years did not adversely affect bone mineral density (BMD)[1]. There are few data on the effects of AI in non-growth hormone deficient (GHD) boys[2]. BMD is not an accurate indicator of bone strength during growth. A novel, non-invasive indicator of bone strength is bone robustness (BR), calculated using a multiple regression model measuring bone mass and growth in width relative to growth in length of the 2nd metacarpal on hand x-rays[3]. Normative growth patterns were derived from films of boys in the Brush study, a longitudinal collection of >4000 x-rays of children and adults, the basis of the Greulich and Pyle atlas[4].

OBJECTIVE: To assess bone strength in pubertal boys with short stature treated with AN.

DESIGN/METHODS: Ten non-GHD pubertal boys, treated with AN 1 mg daily >6 months, and 16 untreated boys with short stature were evaluated. BR (total area/length), cortical area (CA, measure of diaphyseal bone mass) and Metacarpal Index (MCI, cortical thickness/outer diameter) of the 2nd left metacarpal were used to calculate residuals relative to Brush standards for each subject. Residuals were compared in boys on AN before and after treatment and to controls. Data are expressed as mean±SD.

RESULTS: Age, time of follow up and pubertal stage at baseline were not different between AN (age 13.3±1.1y, f/u 17.4±9.2m, Tanner stage 2.3±1.2) and control groups (age 12.5±1.3y, f/u 15.1±8.2m, Tanner 2.1±1.3). BR and CA in AN boys were not different before and after treatment (BR -0.06±0.09 vs -0.04±0.1, CA -3.52±2.25 vs -2.23±3.62) and not different from controls. MCI increased in AN boys after treatment (-0.002±0.78 vs 0.024±0.09, p=0.02) but not in controls (0.003±0.04 vs 0.019±0.06, p=0.22). Mean height SDS in AN group increased (-1.31±0.51 to -1.13±0.48).

CONCLUSIONS: Short-term AN treatment did not adversely affect bone strength in pubertal boys with short stature. The increase in MCI suggests that AN may have a positive effect on bone mass, as previously noted[2]. These preliminary findings need to be confirmed in larger, prospective studies. References: 1. Mauras *JCEM* 2008 93(3):823-831. 2. Hero *Horm Res* 2009 71:290-297. 3. Pandey *J Bone Min Res* 2009 in press. 4. Nelson *Am J Hum Bio* 2000 12(1)1:9.

13 Fellow in Training

Neuroimaging Plays a Role in Evaluation of Pituitary Defects in Children with ISS

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BACKGROUND: Neuroimaging is a part of routine work-up of patients with suspected growth hormone deficiency (GHD) & multiple pituitary hormone deficiencies (MPHD). The role of neuroimaging in diagnosis & management of Idiopathic short stature (ISS) is still under debate.

OBJECTIVE: To study pituitary & brain findings on MRI (Magnetic Resonance Imaging) in patients with ISS & GHD.

DESIGN/METHODS: We reviewed charts of 54 patients with short stature, including 43 with ISS & 11 with proven GHD. All had undergone GHRH stimulation test & MRI of pituitary & brain. In ISS group: mean age at presentation 9.48 ±2.97 years; height -2.54 ±0.54 SDS. In GHD group: mean age was 7.29 ±3.66 years, height -2.71 ±1.28 SDS. In GHD group, 3 patients had MPHD, & 8 had isolated GHD, 2 of these had GHRH receptor mutations.

RESULTS: Among ISS patients 25 were found to have normal structures of brain & pituitary (58.1%), 7 had pituitary microadenoma (16.2%), 6 had hypoplastic pituitary (13.9%) & 5 had (11.6%) miscellaneous brain pathology. 1 had an ectopic posterior pituitary & small anterior pituitary (4%).

table 1

Groups/ MRI	Normal		Hypoplastic Pituitary	Ectopic Pituitary	Absent Sptum pellucidum	Chiary 1 malformation	
GHD	36.3%	18.1%	18.1%	9%	9%	18.1%	
ISS	58.1%	16.2%	13.9%	4%			11.6%

In GHD group 4 patients (36.3%) had normal MRI, 2 (18.1%) had hypoplastic pituitary, 2 (18.1%) had microadenoma, 1 (9%) had ectopic pituitary gland, absent septum pellucidum each & 2 with Chiari I malformation (18.1%). Of 3 patients with MPHD 1had normal MRI, 1 with LHX3 mutation had pituitary microadenoma (ref 1), & 1 had Chiari I malformation with ectopic pituitary.

CONCLUSIONS: Based on presented data, ISS is often associated with abnormalities of pituitary, similarly to GHD. Pituitary MRI is safe & useful tool in evaluation of children with ISS, which can clarify the undefined origin of ISS & also assist in future management. Larger studies are required to establish relation between particular structural defects in ISS.

14 House Officer

Variations in Management of Diabetic Ketoacidosis amongst Pediatricians and Sub-Specialists in United States

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BACKGROUND: Despite consensus statements by the European Society of Pediatric Endocrinology / Lawson Wilkins Pediatric Endocrine Society (2004) and the International Society for Pediatric and Adolescent Diabetes (2009) recommending guidelines for management of diabetic ketoacidosis (DKA), there is no standardized protocol for DKA management in United States.

OBJECTIVE: To study the variations in management of DKA amongst subspecialists, general pediatricians and trainees, and their opinion of a need for written guidelines.

DESIGN/METHODS: We conducted a descriptive study by sending an online survey to specialists (SP) general pediatricians (GP), pediatric residents and fellows (PL). The specialists included intensivists (PICU), endocrinologists (Endo), hospitalists (Hosp) and emergency room attendings (ER). Our questionnaire involved knowledge and management based questions related to fluid, insulin, dextrose, bicarbonate, potassium and monitoring. Responses were categorized into SP, GP, PL and subgroups of SP. Data were statistically analyzed using frequencies and Pearson chi square test.

RESULTS: Out of 1918 electronic invites, 694 participated. We included 577 (83%) pediatricians in our analysis, of whom 44% were SP (20% PICU, 29% Endo, 21% Hosp, 30% ER), 31% GP and 25% PL. Bicarbonate treatment was considered by 50% SP (62% Endo), 60% GP, 58% PL ($p<0.001$). Initial fluid bolus of 10 ml/kg vs 20 ml/kg over 1 hour was considered by only 31% SP (53% Endo), 24% GP, 16% PL ($p=0.003$). There were 50% pediatricians who chose 5% dextrose (D) and 28% chose two bag titrating technique (5% D and 10% D each) vs other D concentrations ($p<0.001$). Amongst SP, 47% PICU preferred using the two bag technique. Potassium as combination of potassium chloride (KCl) and potassium phosphate vs other forms of potassium salts was used by 48% pediatricians. KCl alone was used by 18% pediatricians ($p<0.001$). Significant variation was noted in other aspects of management of fluid, insulin, dextrose and monitoring ($p\leq0.05$). A need for written guidelines was perceived by 62% SP (75% ER), 73% GP and 81% PL.

CONCLUSIONS: There were significant variations in DKA management amongst pediatricians and subspecialists, especially for larger fluid bolus and bicarbonate usage. The majority of subspecialists, general pediatricians and trainees still perceived a need for guidelines.

15 Fellow in Training

Pharmacologic Manipulation of Adrenal Nicotinic Acetylcholine Receptors – Potential for Prevention of Hypoglycemia Associated Autonomic Failure (HAAF)

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BACKGROUND: Recent studies indicate that strict glycemic control in diabetes mellitus results in an increase of all-cause mortality. Intensive blood glucose control is associated with hypoglycemia unawareness, where hypoglycemic episodes are unrecognized until an event proves fatal by causing cardiac arrhythmia. Diabetics lack the immediate defense responses to hypoglycemia: glucagon failure is caused by repetitive insulin exposure while epinephrine release is blunted by recurrent episodes of hypoglycemia. Failure to release Epinephrine after recurrent hypoglycemia is known as HAAF. The brain senses low blood sugar and propagates sympathetic nerve activity to the adrenal medulla releasing presynaptic acetylcholine that acts at nicotinic cholinergic receptors (nAChR) to release epinephrine. Although the cellular signaling triggerred by nAChR stimulation results in two main responses - release of epinephrine and activation of its biosynthesis - the patophysiology of their failure during HAAF remains controversial.

OBJECTIVE: To test whether partial nicotinic receptor agonists can attenuate neurotransmission at nicotinic receptors and thus preserve the adrenal epinephrine response to hypoglycemia.

DESIGN/METHODS: We exploit an adrenomedullary cell culture model - PC12 cells - to test whether nicotinic partial agonist will affect the ability of chromaffin cells to replenish the catecholamine stores. As a marker of epinephrine biosynthesis we quantify tyrosine hydroxylase (TH) mRNA levels by northern blot technique. CE140 (3-Pyridine Cytisine) -100μM - is a partial nicotinic receptor agonist and was used alone or in combination with Nicotine.

RESULTS: 1) Treatment with the full agonist nicotine results in a significant increase of TH mRNA versus vehicle ($p<0.05$) 2) Exposure of PC12 cells to novel partial agonist CE140 causes a modest (p-ns) induction of TH mRNA levels (low efficacy).3) When exposure to CE140 preceded nicotine treatment, the nicotine induction of TH mRNA was attenuated by 50%.

CONCLUSIONS: 1) CE140 has a minor effect on TH mRNA synthesis. 2) CE140 attenuates nicotine induction of TH mRNA. Speculation: By modulating excessive nAChR stimulation, CE140 may help avert the full activation of nAChR and therefore prevent exhaustion of compensatory biosynthetic mechanisms triggered by HAAF.

16 House Officer

Knowledge and Practices about Vitamin D Supplementation among Pediatricians and Family Practitioners

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BACKGROUND: Vitamin D deficiency (ViDD) is known to cause rickets. Trends toward exclusive breast feeding and avoidance of direct sunlight have increased the risk for ViDD. Since screening for ViDD is not routine, the American Academy of Pediatrics (AAP) recently recommended increasing the daily intake of Vitamin D (ViD) to 400 IU in all infants and adolescents.

OBJECTIVE: To assess the primary physicians' awareness of new guidelines on daily ViD requirements, and to compare knowledge and practices about supplementation between pediatricians (PED) and family practitioners (FP).

DESIGN/METHODS: This was a descriptive, observational, cross-sectional study using a 37-question survey to assess primary physicians' knowledge and practices about ViD. The questionnaire was sent electronically to over 2000 PED and FP via Zoomerang. Based on the number of correct answers for knowledge (KScore) and practices (PScore), the survey was scored (S) as L1 (≥80%), L2 (60-79%) and L3 (<60%). Physicians not practicing primary care were excluded. Data were analyzed using percentages for descriptive analyses and chi-square tests for comparisons between categorical variables.

RESULTS: Among 346 visitors to the site, 203 responded, yielding 150 completed surveys. Of the completed surveys, 94 (51%) were PED, of whom 48 were in training, and 56 (55.3%) were FP, of whom 31 were in training. Based on correct answer KScores, L1, L2 and L3 were reached by 0.7%, 81.3% and 18% of physicians, respectively. KScores showed no statistical differences between PED and FP. Inadequate training was perceived by 92% of subjects (100% for FP). Duration of practice and perception of adequate training about ViD did not impact KScores ($p>=0.05$). L1, L2 and L3 PScores were achieved by 0%, 84.7% and 15.3% of physicians, respectively, with a breakdown between groups of: L1(0%), L2 (PED 92.6%, FP 71.4%), and L3 (PED 7.4%, FP 28.6%). PScores were higher among PED ($p=0.002$).

CONCLUSIONS: There was inadequate knowledge and incomplete implementation of AAP guidelines with respect to ViD among both PED and FP. Most practitioners acknowledged the need for more training. Practices regarding ViD supplementation were suboptimal, especially by FP, and duration of practice had little impact on knowledge about ViD by physicians.

17 Fellow in Training

Sex Related Analysis of ALT and Its Association with Metabolic Profile in Obese Children

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BACKGROUND: Alanine aminotransferase (ALT) elevations are considered a surrogate marker of nonalcoholic fatty liver disease.

OBJECTIVE: In the present study we evaluated the prevalence of elevated ALT levels in obese children using recently proposed sex related cut-off ALT values(ALT >30 IU/L for males and >19 IU/L for females) and analyzed the association between ALT levels and metabolic profile in both the sexes.

DESIGN/METHODS: In a retrospective analysis, charts of 155 obese children (BMI z-score > 2 SD for age and sex) who attended pediatric endocrinology clinic at our center (age range 5-20 yrs) with negative markers for viral hepatitis were analyzed.

RESULTS: 5.4±6.2#33 (47%) boys and 44 (52%) girls had elevated ALT levels. Overall boys had higher TG and lower HDL values than girls. TG values were significantly increased and HDL decreased in children with elevated ALT levels irrespective of sex. There was no difference in age, BMI, and blood pressure values between children with and without elevated ALT. Homeostasis model assessment of insulin resistance(HOMA-IR) showed a tendency to be higher in girls with elevated ALT levels ($p=0.06$). ALT levels correlated significantly with TG (r= 0.34), HDL (r= -0.26), TG/HDL (r= 0.37), fasting glucose (r= 0.45).

Table 1: Metabolic profile of subjects(n=155)

	Obese boys	Obese girls
n	71	84
BMI	35±8.9	34±5.8
ALT	33.2±22	29.5±32
TG	168±106	131.6±60*
HDL	38.9±9.2	42.7±11*
HOMA-IR	5.7±5.2	5.1±8.1

* $p< 0.05$

Table 2: Metabolic profile of boys and girls according to ALT levels

ALT Levels	≤30 IU/L(Boys)	>30 IU/L(Boys)	≤19 IU/L(Girls)	>19 IU/L(Girls)
n(%)	38(53)	33(47)	40(48)	44(52)
TG	140±72	193±126*	106±42.7	155.4±64.3*
HDL	41±9	36±9*	46.3±1.1	39.4±10.2*
HOMA-IR	4.7±4.8	7±5.5	3±1.3	5.4±6.2#

* $p< 0.05$ # $p=0.06$

CONCLUSIONS: There is a large prevalence of elevated ALT levels in obese children associated with adverse metabolic profile by using updated age and sex related cut off values for ALT. This is much higher, specially in girls, than reported in most pediatric studies using ALT cut off at 40. Further long term, prospective studies in children using these cut off limits will further clarify the value of this observation.

18

The Correlates of Attributes of the Built Environment around Schools and Self-Reported Physical Activity in Inner City Fifth Graders

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BACKGROUND: The benefits of physical activity are well documented with lower rates of obesity, heart disease, stroke, hypertension, colon cancer, type II diabetes, depression and anxiety in those who are regularly physically active. There is evidence that modern environments may not be conducive to being physically active. Many of the unique factors that pertain to physical activity in inner city poor minority children remain undefined.

OBJECTIVE: To evaluate if there is a relationship between physical activity questions on the fifth grade Youth Risk Behavior survey (YRBS) and the built environment attributes surrounding elementary schools in an urban area.

DESIGN/METHODS: Youth risk behavior survey results for fifth graders were aggregated by schools. The mean response scores were tabulated for activity questions including days per week of aerobic exercise, hours per day watching TV, days per week in PE class, proportion participating in sports and proportion who walk to school. Using a Geographic Information System, 1/4th mile buffers were placed around schools and the count of food sources for convenience, supermarkets and fast food outlets were computed. Additionally, the proportion of buffer which is open space land was determined. School demographics included minority status and enrollment in free school lunch. Bivariate ordinary least squares (OLS) regression with spatial diagnostics was applied for predictors of physical activity.

RESULTS: Exercise was negatively related with the number of fast food outlets ($R^2 = 0.139$, $p = 0.024$), convenience stores ($R^2 = 0.120$, $p = 0.034$) and supermarkets ($R^2 = 0.151$, $p = 0.019$) in the buffer. Also, exercise was negatively related to enrollment in free school lunch ($R^2 = 0.115$, $p = 0.038$). Hours of TV were related to minority status ($R^2 = 0.161$, $p = 0.016$) and enrollment in free school lunch ($R^2 = 0.252$, $p = 0.027$). P.E. was related to sports ($R^2 = 0.232$, $p = 0.004$) and walking to school was inversely related to open space ($R^2 = 0.270$, $p = 0.002$). Spatial autocorrelation was not found to be an issue using spatial lag regression modeling when needed.

CONCLUSIONS: In this study of inner city fifth grade students, it appears the number of food sources in the built environment, enrollment in free school lunch, minority status and open space were negatively correlated with physical activity levels; and enrollment in sports was positively associated with physical activity levels.

19 Medical Student

Travel Patterns and Resource Use by Urban, Minority Children in East Harlem, New York

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BACKGROUND: A growing body of literature is using Geographic Information Systems (GIS) to examine the role of neighborhood environment on risk for childhood obesity. These environmental factors include proximity to food stores and physical activity resources. This study investigated travel patterns and neighborhood resource use by urban, minority children in East Harlem.

OBJECTIVE: To analyze children's travel patterns within their community and assess differences in travel distances by types of resources used: fast food restaurants, food stores, and physical activity resources.

DESIGN/METHODS: Growing Up Healthy Study data (n=334) for home address and use of fast food restaurants, food stores, and physical activity resources were geocoded in ArcView GIS. Paths between home and each resource were determined with Network Analyst extension of ArcView GIS. Ten paths were randomly selected to verify calculated distances by comparing with Google Maps distances.

RESULTS: McDonald's was the most frequently reported fast food restaurant (48%). The largest supermarket (Pathmark=16%) and park (Central Park=17%) were among the most frequently used food stores and physical activity resources. Mean distances traveled to fast food restaurants, food stores, and physical activity resources were 396, 550, and 524 meters, respectively. Mean distance traveled to supermarkets was significantly greater than to other food stores ($p<.001$). In contrast, mean distance traveled to fast food restaurants was significantly less than both food stores ($p<0.001$) and physical activity resources ($p<0.001$).[figure1]

CONCLUSIONS: These data suggest families routinely travel farther to supermarkets, while frequenting fast food restaurants closer to home. Advances in ArcView GIS methodology can provide insights into obesity related behaviors influenced by the neighborhood environment. Assessing travel patterns and resource utilization can inform community level interventions and public health policies that promote healthy behaviors and communities.

20 Fellow in Training

Waist Circumference z-Scores Are Better Correlates of Multiple Adiposity-Related Co-Morbidity Risk Factors Than BMI z-Scores in Early Adolescence

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Reduce Obesity and Diabetes (ROAD) Project, AMDeC, NY, NY.

BACKGROUND: Body Mass Index (BMI) is commonly used as an index of body fatness.Waist circumference (WC) is an easily obtainable anthropometric measure to identify children with increased central adiposity.

OBJECTIVE: To examine whether BMI or WC is a better correlate of risk factors for adiposity-related co-morbidities.

DESIGN/METHODS: We analyzed anthropometric (BMI and WC), clinical (systolic and diastolic BP's) and biochemical [lipids, and inflammatory cytokines (ie: IL-6] from 162 school children 11-15 yrs of age as a part of ROAD consortium. Insulin secretory capacity was measured as AIR (mean rise in insulin 3 and 5 minutes after 25 gm of i.v. dextrose) and GDI[$\log_{10}$(AIR x [fasting glucose] /[fasting insulin])] HOMA and QUICKI indices were calculated. WC and BMI z-scores were regressed against clinical and biochemical variables using a multiple stepwise linear regression analysis such that the effects of each z-score are "corrected" for the fractional variance attributable to the other. Analyses were performed in all subjects and in a subgroup who were overweight (BMI > 85%Ile for age and sex).

RESULTS: Significant correlations of waist circumference, but not BMI z-scores were found with indices of insulin sensitivity and HDL cholesterol. Significant correlations of BMI, but not waist circumference z-scores were found with IL-6. Similar findings were obtained in the entire subject population and only those subjects with BMI > 85%ile (see **Table 1)**.

Table 1. Correlates of WC and BMI z-scores with co-morbidity risk factors.

	All Subjects (n=160)		BMI > 85% (n=76)	
	WC z-score (beta)	BMI z-score (beta)	WC z-score (beta)	BMI z-score (beta)
Diastolic BP	0.23^	0.07'	0.19'	0.016'
HOMA	0.26*	0.06'	0.23^	-0.02'
QUICKI	-0.34*	-0.07'	-0.29*	-0.06'
HDL	-0.27*	0.18'	-0.21^	0.12'

^p-value=0.05-0.08 , ' p-value = no statistical significance , * p-value<0.01

CONCLUSIONS: Waist circumference z-scores are, by and large, better correlates of risk factors for multiple adiposity-related co-morbidities than BMI z-scores. These data suggest that measurement of waist circumference may be a better index of metabolic and cardiovascular risk than BMI.

21 Fellow in Training

Waist Circumference Is a Better Marker Than BMI in Predicting Body Fat and Insulin Sensitivity in Middle School Children

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Reduce Obesity and Diabetes (ROAD) Project, AMDeC, NY, NY.

BACKGROUND: Waist circumference (WC) is closely related to development of insulin resistance and metabolic syndrome. WC is also a better measure of the visceral/central adiposity as compared to BMI yet it is rarely used by the primary care physician.

OBJECTIVE: To compare WC z-score and BMI z-score as a predictor for development of insulin resistance.

DESIGN/METHODS: 162 children (aged 11-15) were studied as a part of the ROAD (Reduce Obesity and Diabetes) study. Measurements of height, weight, WC, and body fat %, systolic & diastolic blood pressures were obtained. Fasting glucose, Insulin and a 5 min IVGTT was performed. BMI z-score, WC z-score, HOMA, QUICKI, Acute Insulin Response (AIR), Glucose Disposition Index (GDI) indices were calculated. The data was divided into 2 subgroups based on the WC Group 1 with WC < 90% & Group 2 WC >90%.The same group was divided based on BMI into 3 groups based on the standard definition of healthy, overweight and obesity. The data was analyzed using unpaired t-test and regression analysis. Correlation analysis was performed between BMI z-score and WC z-score against metbolic parameters.

RESULTS: WC Z-score correlated much better with body fat % as compared to BMI Z-score. The HOMA index correlated better with WC z-score than with BMI z-score. WC z-score and BMI z-score also correlated strongly with Wt SDS, Ht SDS, BF%, fasting insulin, DBP and negatively with QUICKI (Table 1). The metabolic parameters were also significant different in subjects with WC > 90% as compared with a t test with WC <90% (Table 2).

Correlation of WC & BMI for various components:

	Body Fat %	Insulin 0 min	HOMA	QUICKI
WC z-score r	0.68*	0.28*	0.3*	-0.37*
BMI z-score r	0.58*	0.24*	0.25*	-0.31^

* P < 0.0001 ^P < 0.01

Statistical Differences noted in groups based on WC

Waist Circumference	<90%	>90%
Body Fat %	23±7.3*	34.5±6.4*
Insulin 0 min	8.25±6.5*	13.25±8.6*
HOMA	1.84±1.41*	3.04±2.1*
QUICKI	0.35±0.02*	0.33±0.03*

*P < 0.0001

CONCLUSIONS: Our data shows that WC z-score correlates better than BMI z-score with measures of insulin resistance. WC z-score is also a better marker for body fat % which is a precursor to insulin resistance and metabolic syndrome.

22 House Officer

The Use of Body Image Silhouettes in a Latino Community

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BACKGROUND: Latino children are at a disproportionately high risk for becoming overweight. Body image silhouettes have been used to study an individual's ability to correctly assess his or her weight, but few have involved Latinos. It is important to understand the ability of this population to correctly identify their weight category in order to develop strategies to combat the obesity epidemic.

OBJECTIVE: To assess the ability of Latino parents to correctly pick their BMI from a set of body image silhouettes and to determine which factors are responsible for the discordance between real and perceived BMI.

DESIGN/METHODS: Data was collected at an inner city pediatric practice in Northern Manhattan. 231 parents were shown Stunkard's 9 body image silhouettes and asked to choose the one most resembling their figure. They also completed a 21-question survey, including demographics, self reported height and weight, and whether they viewed themselves as underweight, normal weight, or overweight. Correlation coefficients were determined for calculated BMI and self-reported BMI category as well as calculated BMI and chosen silhouette BMI. Using multiple logistic regression a model was developed to predict factors significantly affecting parents' ability to correctly select the silhouette that represented their BMI.

RESULTS: Participants were mostly Latino (93%) from the Dominican Republic (52.8%). 59.7% primarily spoke Spanish. Based on reported height and weight, 1.5% of respondents were underweight, 41.9% were normal weight, 33.3% were overweight, and 23.2% were obese. The correlation coefficient between calculated BMI and self-reported BMI category was 0.52; the correlation coefficient between calculated BMI and chosen silhouette BMI was 0.53. Controlling for potential confounders, age and obesity were found to significantly affect choice of the correct silhouette. Obese individuals had 92% lower odds of picking the correct silhouette (95% CI 0.03-0.2). Also, the older an individual, the more likely he or she was to pick the correct silhouette. Height, duration in the US, race, insurance and education level, were not significant.

CONCLUSIONS: Body image silhouettes, which were created for and have primarily been studied in Caucasians, must be used with caution in young Latino adults, particularly those who are obese. Further studies are needed using pictorial figures devoid of ethnic-specific facial and body qualities for assessment of body image in Latino individuals.

23 Fellow in Training

A Novel Approach To Combat Pediatric Obesity Modeled after a Successful Program for Adults

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BACKGROUND: Half of adults and 43% of New York City elementary school children are overweight or obese. The NYC Department of Health & Mental Hygiene seeks to combat chronic illnesses such as obesity through the Public Health Detailing Program, a primary care provider outreach initiative modeled on pharmaceutical detailing. Success of an Adult Obesity Action Kit led to development of an *Obesity in Children* Action Kit, both containing clinical tools, patient education materials and provider resources. The 3 key recommendations for both campaigns encouraged providers to: (1) assess all patients for overweight and obesity using BMI (2) educate patients about healthful eating and physical activity and 3) help patients set realistic goals for healthy eating and exercise.

OBJECTIVE: To introduce an adult and pediatric obesity campaign and action kit to medical providers and staff, and to assess the self-reported uptake of key recommendations and kit materials.

DESIGN/METHODS: Health care sites in previously identified high-need areas in Brooklyn, the Bronx and Harlem were chosen for both campaigns. The Adult Obesity campaign was conducted from March-July 2008; the Pediatrics campaign began in July 2009. Interactions with providers and office staff included unscheduled visits and scheduled group presentations by PHDP representatives. At the initial visit, reps administer an assessment survey, reinforce key recommendations, and introduce the kit. At a follow up visit the assessment questions are re-administered.

RESULTS: The Adult Obesity Campaign reached a total 199 sites with 455 visits and 2,433 contacts. Of 178 providers who completed initial and follow up surveys, the percentage who reported using clinical tools and/or key recommendations increased from 27% at initial visit to 95% at follow-up. At follow up 47% of providers reported assessing BMI and weight, vs. 25.2% initially (p=<.05), and 95.8% vs. 77.2% (p=<.05) did goal setting with patients. Similar tools were developed and have been in incorporated in the Obesity in Children Action Kit. The pediatric campaign targets of 167 Pediatrics and Family Practice sites. Data collection is ongoing.

CONCLUSIONS: Materials from an obesity campaign targeting adults in NYC were well received and widely implemented by providers. The most successful tools were used to develop a kit to combat pediatric obesity, targeting providers in the same neighborhoods, hopefully leading to similar outcomes.

24

Is Decreasing Visual Acuity Associated with Higher BMI in Children?

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BACKGROUND: Childhood overweight and obesity has escalated during the past 30 years with certain groups at more risk. The prevalence of visual impairment among US children and adolescent is 6.8/10,000, with varying levels of visual acuity. Decreased visual acuity may increase the risk of being overweight or obese in this population. No data is available to support a link between decreasing visual acuity and an increased risk of overweight or obesity.

OBJECTIVE: To examine the relationship and prevalence of overweight and obesity among children with visual impairment.

DESIGN/METHODS: This is a cross-sectional study of ambulatory children enrolled in a specialized school for the visually impaired in Bronx, NY. Demographic and physical exam data was collected for each child. Children were divided into 4 groups based on the degree of visual acuity in the best eye, in accordance with the competitive sports classification of International Blind Sports Federation (see table). Statistical analysis focused on the relationship between each group of visual impairment and the frequency of overweight and obesity (chi-square and ANOVA).

RESULTS: 98 subjects were enrolled in the study. The mean age (±SD) was 13.3±4.0, range 5 to 21 years. 31% of the students resided at the school during the weekdays and 56% were female. Hispanic and African American students were the majority (43 and 36% respectively), followed by Caucasians (12%). BMI ranged from 14 to 42 with a mean of 22±5.8. The study group had an average overweight (BMI ≥ 85%) rate of 13.3% and an obesity (BMI ≥ 95%) rate of 32.7%. These were slightly higher than the average for NY State (12% and 24% respectively). There was no significant difference among the 4 subgroups of visual acuity (ranging from visual acuity of 20/60 to no light perception) both for the rates of overweight (p=0.58) and obesity (p= 0.45).

Visual acuity (BSA classification) and obesity rates*

	Definition	N	Obesity %
Class B1	No light perception up to light perception	20	35
Class B2	Hand movement perception up to 20/600	15	46
Class B3	20/600 up to 20/200	49	28
Class B4	20/200 up to 20/70	14	28
Total		98	32

*NS, by ANOVA

CONCLUSIONS: These data suggest that although children and adolescents with visual impairment tend to have a higher BMI than the general population, decreasing visual acuity alone was not associated with increased rates of overweight or obesity.

25 Fellow in Training

Short and Long Term Neurodevelopmental Outcomes after Treatment of Patent Ductus Arteriosus with Ibuprofen Versus Indomethacin

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BACKGROUND: Ibuprofen treatment of patent ductus arteriosus (PDA) has been shown to be as effective as indomethacin. Indomethacin, unlike ibuprofen, is thought to reduce cerebral blood flow velocity and cerebral oxygenation, which could lead to cerebral ischemia and/or periventricular leukomalacia (PVL). This could significantly influence neurodevelopmental outcomes of babies treated for PDA.

OBJECTIVE: Ibuprofen and indomethacin treatment of PDA have comparable effects on the frequency of severe IVH or PVL, and long term neurodevelopmental function.

DESIGN/METHODS: At the end of 2006, our institution switched from routinely using indomethacin to ibuprofen. An IRB-approved, retrospective chart review (2005-2008) was performed. Neurodevelopmental follow up data were collected at corrected age of 4-6 months, 8-13 months, and last available developmental follow up visit. The same developmental pediatrician evaluated all patients using Gesell Developmental Screen for the presence and severity of developmental disabilities (absent, mild, moderate or severe) and for cerebral palsy (CP). Incidence and grade of IVH and PVL were also recorded. Chi-square and logistic regression modeling were used for data analysis.

RESULTS: There were no significant differences between treatment groups in short or long term neuromorbidities.

Study Outcomes

	N	Severe IVH or PVL	Death	% of survivors followed up (n)	CP	Developmental disabilities
Indomethacin	165	9.1%	7.3%	76% (116)	7%	44%
Ibuprofen	186	9.2%	9.7%	76% (127)	10%	40%

There were also no differences in disabilities or CP, in the absence of severe IVH or PVL, using univariate or multivariate analyses. On multivariate analyses, the odds (OR [95%CI]) of disabilities were significantly decreased by older gestational age (0.6 [0.4-0.9], p< 0.02) and female gender (0.4 [0.3- 0.7], p< 0.002), increased by severe IVH or PVL (OR 3.4 [1.5 – 7.8], p< 0.004), and unchanged with treatment.

CONCLUSIONS: There were no differences in the rates of IVH or PVL at follow up in infancy after use of either indomethacin or ibuprofen for treatment of PDA. There were also no differences in the rates of CP or developmental disabilities between groups. These data, on a substantial number of patients, suggest that ibuprofen and indomethacin have similar safety profiles with respect to neurodevelopmental outcomes, an important consideration when choosing medications for PDA treatment.

26 Fellow in Training

Comparison of Renal Effects of Ibuprofen Versus Indomethacin during Treatment of Patent Ductus Arteriosus

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BACKGROUND: Ibuprofen treatment of PDA has been shown to be as effective as indomethacin in small randomized controlled trials, with possibly fewer adverse effects. However, adverse renal effects of ibuprofen have been noted in some trials and suspected in our practice.

OBJECTIVE: To examine whether ibuprofen and indomethacin treatment of PDA have comparable effects on renal function as evidenced by urine output and serum creatinine.

DESIGN/METHODS: At the end of 2006, our institution switched from using indomethacin to ibuprofen. IRB-approved, retrospective chart review of 351 patients (2005-2008). Serum creatinine and urine output were recorded prior to start of treatment, during each course and after the last course. Pre-treatment creatinine and urine output means were compared to treatment and post

treatment means using 2-factor repeated measures ANOVA using Minitab and SPSS. Dunnett's post-hoc test was used to compare changes from baseline to each treatment course.
RESULTS: 186 patients received ibuprofen (2007-2008) and 165 indomethacin (2005-2006). There was no difference between drug treatment groups in gestational age, birth weight, gender, or baseline creatinine and urine output. The number of courses needed (p=0.0001) inversely correlated with both birth weight and gestational age. During the first course (all patients) there was a significant change in renal function with both drugs, greater with indomethacin. In the 218 patients who received only one course, there was a significant increase in creatinine (by 0.1mg/dL, p=0.001) after indomethacin. The 125 neonates who received 2 ore more courses, decrease in urine output and increase in creatinine was not significantly different between drugs. Interaction between course number and drug type was seen, with greater decreases in urine output from baseline in the second (by 0.9 ml/kg/hr, p=0.002) and third (by 0.9 ml/kg/hr, p<0.05) courses of ibuprofen. Renal effects post-treatment returned to baseline, regardless of the number of courses.
CONCLUSIONS: Both drugs have a similar detrimental effect on renal function, which is more evident with urine output. Indomethacin had more prominent initial renal effects. Ibuprofen decreased renal function in the 2nd and 3rd courses, similarly to indomethacin. Clinical management during PDA treatment should anticipate changes in renal function, especially with multiple courses.

27 Fellow in Training

Is There a Genetic Basis for Responsiveness of PDA to Ibuprofen in Premature Neonates?

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BACKGROUND: The successful medical closure of PDA in ELBW infants may be influenced by a number of factors, including the balance between the expression of prostaglandins and their inhibitory NSAIDs. Persistence of a ductus may be the consequence of either prostaglandin over-expression or increased metabolism of the medication targeted to inhibit this prostaglandin. Specifically, genetic foundations for this in/balance may be found in single nucleotide polymorphisms (SNPs) of prostaglandin synthase (PTGS/COX) and/or in SNPs of genes responsible for the metabolism of NSAIDs-CYP2C8 and CYP2C9.
OBJECTIVE: We hypothesize that there is a genetic basis for responsiveness to ibuprofen treatment of PDA in ELBW neonates
DESIGN/METHODS: ELBW infants are routinely screened for PDA by echocardiography on day 2-4. Those with moderate to severe PDAs with left-to-right flow are medically treated with 3 doses of ibuprofen. Responsiveness to medical treatment is assessed by echocardiogram, and repeat courses of ibuprofen (total=3) may be given, prior to the need for surgical ligation. DNA isolated from buccal swabs is purified, and subjected to real-time PCR utilizing specific Taqman probes for allelic discrimination. ANOVA and chi-squared analyses were performed, with statistical significance at p<0.05.
RESULTS: This is an prospective ongoing study, which has analyzed 16 patients to date-12 closed their PDAs after ibuprofen treatment and 4 required surgical ligation. Gestational ages and birth weights were not different.

Demographics

	Medical Treatment	Surgical ligation
Gestational age (week)	26±1.8	26±0.8
Birth weight (grams)	749±191	808±31

P)0.5

More boys needed ligation (3:1) while girls responded better to ibuprofen (m:f =3:5).There was no difference in racial distribution. SNP analyses revealed a CYP2C8 SNP with different genotype distributions between those who closed their PDA with medical treatment compared to those who failed medical treatment and required ligation (P=0.08).

CYP2C8 genotype and PDA response to Ibuprofen

Genotype	Medical treatment	Surgical treatment
GA	0	2
GG	12	2

P=0.08

CONCLUSIONS: A SNP for CYP2C8, involved in the metabolism of ibuprofen, was close to significance when ELBW infants who closed their PDA medically were compared to those requiring surgical ligation. Other SNPs of COX1,COX2, and CYP2C9 were not associated with medical closure of the PDA in ELBW infants.

28 Fellow in Training

Patent Ductus Arteriosus in Extremely Preterm Infants: How Many Courses of Indomethacin Are Appropriate before Surgical Ligation?

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BACKGROUND: Patent ductus arteriosus (PDA) is very common in extremely low birth weight infants and is responsible for increased mortality and morbidity. PDA is usually treated with cyclooxygenase inhibitors (COI). Failure of ductal closure after the first course of COI is reported to be between 20 to 40 %. Surgery is often needed when medical treatment fails. However, there is controversy as to how many courses of COI should be attempted before committing the patient to surgery.
OBJECTIVE: The aims of this study were to evaluate the rate of failure of indomethacin and the incidence of surgery in infants with birth weight (BW) ≤ 750g. We also wanted to assess if any other clinical factors in addition to prematurity and low birth weight can predict successful closure of the PDA with COI treatment in this population.
DESIGN/METHODS: Infants with BW ≤ 750g born between January 1, 2004 and July 31, 2009 were retrospectively reviewed. We determined the incidence of spontaneous closure of ductus arteriosus, symptomatic PDA, the failure rate of the 1-3 courses of COI treatment, and the outcome of these infants.
RESULTS: A total of 88 infants with BW ≤750g were born between January 1, 2004 and July 31,2009. Among them, 52 (59%) infants survived to discharge. A cohort of 39 medical records was available to be reviewed. 7/39 (18%) infants had spontaneous closure of PDA, 6/32 (19%) infants closed their PDA after the first course of COI, and 6/26 (23%) closed their PDA with an additional course. While only 8 infants received a third course, 3/8 infants closed their PDA. The remainder of the infants 17/32 (53%) underwent surgical ligation. Infants with spontaneous closure of PDA were more mature (28 weeks versus 25 weeks, P<0.05) and had lower CRIB II score (11.5 versus 13.6, P<0.05). However, there were no statistically significant differences between the infants who responded to COI treatment and those who failed (underwent surgery) in terms of BW, gestational age, CRIB II scores and duration of hospitalization.
CONCLUSIONS: A high percentage of infants born with BW ≤ 750 grams develop a symptomatic PDA and do not respond to COI treatment. The efficacy of repeated courses of COI after failure of a single course to achieve ductal closure is relatively low. The preferred intervention for persistent symptomatic PDA in extremely premature infants after failure of a single course of COI needs further evaluation.

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Car Seat Tests – Are They Worth It?

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BACKGROUND: The AAP has recommended all infants <37 weeks gestation spend a period of observation in a car seat prior to hospital discharge to assess for apnea, bradycardia or oxygen desaturation. The most recent Cochrane review found no randomized trials fulfilling appropriate criteria to assess this issue, and suggested further studies to determine if the car seat challenge accurately predicts the risk of clinically adverse events.
OBJECTIVE: We reviewed our recent experience with car seat tests to determine if it accurately predicts the risk of adverse events when compared to the pneumogram.
DESIGN/METHODS: Retrospective chart review of all infants in both the term nursery and the NICU who had a car seat test performed between 1/05 and 12/08. Car seat studies are performed within 24 hours of hospital discharge on infants < 37 weeks gestation or SGA. Infants failing the test are retested with adjustment of position. Infants failing 3 times are discharged in a car bed. Per hospital protocol, infants < 35 weeks gestation at birth also have a 24 hour pneumogram performed within 48 hours of discharge.
RESULTS: 785 infants had car seat tests and only 43 (5.5%) failed their initial test. There were no significant differences in gestational age at birth (34.2±3.3 v. 33.5±3.5 wks; p=0.2) or birth weight (2.24±0.6 v. 2.1±0.67 kg; p=0.18) between all infants studied and those who failed their initial car seat test. 313 infants had a pneumogram in addition to the car seat test. 178 of them (56.8%) had an abnormal pneumogram, even though the vast majority, 158 (88.6%), passed their car seat test. Infants whose pneumograms were normal were significantly older at birth (GA=33.1±2.2 v. 31.2±3.5 wk; p=0) and of greater birth weight (1.87±0.4 v. 1.67±0.6 kg; p=0.0005) than those with abnormal pneumograms. Compared to the pneumogram, the sensitivity of the car seat test for determining clinically significant events was 0.1; the specificity was 0.94, the positive predictive value 0.69 and the negative predictive value 0.45.
CONCLUSIONS: The car seat test is not effective at identifying those infants at risk for a significant clinical event such as apnea, bradycardia or oxygen desaturation when compared to pneumogram evaluation. Consideration should be given to performing a pneumogram on those infants who fail a car seat test to better delineate their cardiorespiratory abnormalities.

30 House Officer

Car Safety Seat Testing in Level I Nurseries: Are We There Yet?

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BACKGROUND: The 2009 American Academy of Pediatics guideline, "Safe Transportation of Preterm and Low Birth Weight Infants at Hospital Discharge," advocates that car safety seat testing be performed on late preterm infants. Travel in a semi-reclined position in car safety seats places these infants at risk for cardiorespiratory events. In 2003, only 22% of Level I nurseries were performing car safety seat testing.
OBJECTIVE: Examine the frequency of car seat testing in Level I nurseries, compliance with policy recommendations, and barriers to performance.
DESIGN/METHODS: Data were collected via survey. Hospitals with free standing Level I nurseries completed an email survey. Hospitals with Level I within II/III nurseries were recruited from a NICU listserve and completed an online survey. Survey questions were chosen to assess compliance with the 2009 AAP policy.
RESULTS: There were 65 surveys returned: 16 complete surveys were from free standing Level I nurseries and 39 were from Level I/II/III nurseries. All but 2 (96%) hospitals admitted late preterm infants to their Level I nurseries and 75% (82% in Level I and 73% in Level I/II/III) did car seat testing before discharge. A policy was present in 92% of Level I nurseries and it required infants less than 37 weeks (86%) be tested by NRP (70%) and National Highway Transportation and Safety Administration (17%) trained staff. Duration of test was >= 90 minutes in 53%. For failing infants, 39% were monitored supine for further events, 56% were discharged in a policy-mandated car bed, and 39% were retested before transitioning from car bed back to car seat after discharge. Education to limit time in the car seat was provided 81%. Impact of attitudes on behavior was examined. Staffing constraints (50%), disagreement with guideline evidence (43%), budget constraints (18%) and too few infants <37 weeks (18%) were barriers quoted that negatively impacted test performance. Amazingly, only 20% believed that car beds were as safe as car seats in a crash.
CONCLUSIONS: In 2009, hospitals with Level I nurseries perform car seat testing 75% of the time, a marked increase from 22% in 2003. To be compliant with the guideline, nurseries should standardize test length to >= 90 minutes and, for failing infants, rates of supine monitoring after an event in a car seat, car bed discharge rates, and retesting as an outpatient need to be improved. Crash test results for car beds demonstrating their safety should have better dissemination.

31 Fellow in Training

Tidal Volume in Infants with Congenital Diaphragmatic Hernia

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BACKGROUND: Optimal ventilatory strategies that minimize lung injury in infants with Congenital Diaphragmatic Hernia (CDH) are not well studied. Volume guarantee (VG) ventilation may reduce lung injury, because volume, not pressure is the key determinant of lung damage. VG is the primary mode of support in our institution, targeting $PaCO_2$ of 40-55 mmHg. High-frequency jet ventilation is used only as rescue when high pressure is needed. Appropriate tidal volume (VT) in patients with CDH and pulmonary hypoplasia might be expected to be lower than in other infants of similar weight. However, there are no published data to guide selection of VT in these unique patients.

OBJECTIVE: To provide normative data for VT required to achieve adequate $PaCO_2$ in neonates with CDH.

DESIGN/METHODS: We reviewed medical records of all infants admitted to Georgetown University Hospital with CDH from 1997 to 2009 managed with conventional ventilation during at least a portion of their acute illness. Patient demographics, mode of ventilation, ventilator settings, observed VT, respiratory rate (RR) and corresponding blood gas values pre and post-surgery were recorded. Minute ventilation (MV) was calculated as RR x VT. Only VT values with corresponding $PaCO_2$ in an acceptable range of 35 to 60 mmHg were included. Mean VT/ kg and MV/kg were calculated for each patient and these mean values were then subjected to descriptive statistical analysis.

RESULTS: Eighteen patients were managed on conventional ventilation during this period. Mean gestational age and birth weight were 38.4 ±2wks and 3340±475g. Four patients were on conventional ventilation only after surgery and 1 was extubated without surgery. Four patients required ECMO in the pre-op period for severe persistent pulmonary hypertension. Mean VT was 4.61 ± 0.80 ml/kg (3.82-6.58) before surgery and 4.52 ± 0.82 ml/kg (3.13 -6.39) after surgery (p=NS). Mean respiratory rate was 58.4 ± 6.0 pre and 56.6 ± 4.6 post surgery. Mean MV was 272.2 ± 44.0 ml/min/kg (197.9-330.3) before surgery and 249.2± 47.2 ml/min/kg (155.2-325.4) after surgery. The mean $PaCO_2$ was 43.7 ± 2.2 mmHg pre and 44.8 ± 2.9 mmHg post surgery.

CONCLUSIONS: Despite their pulmonary hypoplasia, the VT associated with acceptable $PaCO_2$ values in infants with CDH is comparable to VT in infants of similar age and weight. This should not be surprising, because their CO_2 production is not different and thus they need similar MV. These are the first normative data to guide selection of VT in infants with CDH.

32

Adaptive Control of Inspired O_2 To Maintain Oxygenation Stability in Preterm Infants

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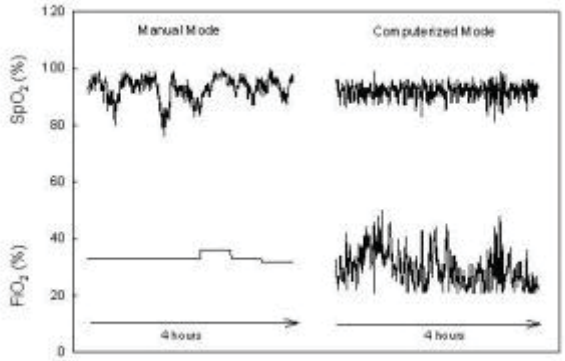
BACKGROUND: Premature infants are at increased risk of developing complications related to oxygen use. A closed-loop adaptive oxygen control device that automatically adjusts the inspired O_2 (FiO_2) to maintain pulse oximetry within a set range would be an ideal strategy to manage the infant's exposure to oxygen.

OBJECTIVE: To evaluate a closed-loop adaptive device and compare the automated regulation of FiO_2 in maintaining a target oxygenation range to manual FiO_2 regulation based on routine standard care on preterm neonates treated with high flow nasal cannula (HFNC) or nasal cannula (NC).

DESIGN/METHODS: Each infant was studied for 4 hours on 2 modes of O_2 control: automatic computerized adjustment of FiO_2 (adaptive control) and the manually adjusted FiO_2. The percentage of time each infant spent in the target range of ±3% of the desired oxygenation (SpO_2) was calculated and compared for both modes.

RESULTS: Preterm infants who required supplemental oxygen by HFNC or NC were studied (N=15; [mean±SD] birth wt 935 ± 299 grams, gestational age 27.1 ± 2.1 weeks; at time of study, weight 1865 ± 547 g, age 51.1±23.4 days, FiO_2 0.31 ± 0.08). The changing trends in the SpO_2 and FiO_2 values during both modes for one subject are shown in Figure 1.



This typical case shows how the SpO_2 was maintained in the target range as the FiO_2 automatically adjusted in the computerized mode. For the 15 infants studied, the percent time in the target SpO_2 range was maintained at 79.4±12.7% for the computerized mode and at 58.5±18.8% for the manual mode (P <0.001, Student's T-test).

CONCLUSIONS: There was a 36% increase in the percentage of time spent in the target SpO_2 range during the computerized mode of the closed-loop adaptive O_2 control device when compared to the manual mode. Further studies are necessary to determine long term outcomes of this device use in preterm infants or to expand its application. **Acknowledgement:** We thank Columbia Life Systems, Inc. for the use of their device in this study.

33

Timing the Peak Occurrence of NEC in Premature Infants ≤ 34 Weeks Gestation

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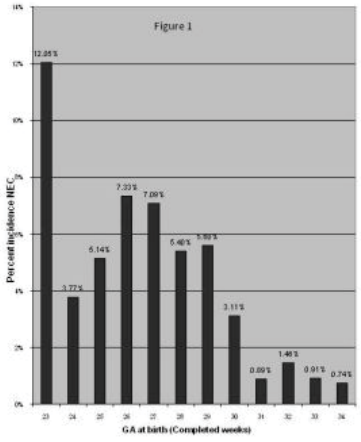
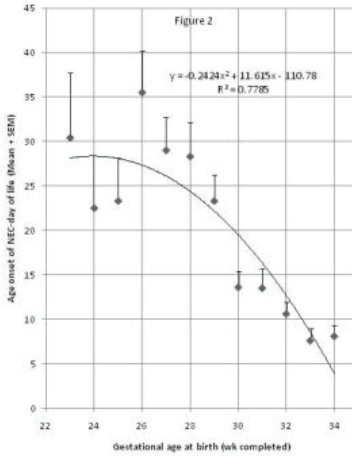
BACKGROUND: Infants of ≤34 wk gestational age (GA) at birth are at increased risk of necrotizing enterocolitis (NEC). Factors leading to NEC in premature infants are yet to be fully elucidated. Timing the peak occurrence of the NEC may yield important clues to its pathophysiology.

OBJECTIVE: To describe the timing of onset of NEC in premature infants (≤34 wk GA) admitted to the NICU.

DESIGN/METHODS: A retrospective study was done with ≤34 wk GA infants admitted to the Univ. of CT Health Center NICU from Jan 1990 to Jun 2009. During this time-period a uniform feeding protocol was used. Infants with NEC (Bell's stages 2 or 3) based on clinico-radiographic findings were studied. Spontaneous intestinal perforations without NEC were excluded. Incidence of NEC was calculated for each GA group and postnatal timing of NEC was calculated for the post-menstrual age (PMA) and the day of life (DOL) at onset.

RESULTS: Of the 4,926 infants ≤34 GA wk, NEC was confirmed in 142 (3%) infants. A high rate (13%) was noted for the 23 wk GA group; and for other groups the incidence ranged from 7.3 - 0.7% with poor correlation with GA at birth (Fig. 1). The mean PMA of onset of NEC was 31.3 wk (median 31.5); and the peak occurrence of this condition was between 30-34 wk PMA. The mean (and median) DOL of onset was 27.9 days. Peak timing (DOL) of NEC was inversely correlated with GA at birth with mean onset at 28 days for the most immature infants and 7 days for the most mature (Fig. 2).





Timing of initiation of postnatal medications such as steroids, indomethacin, and diuretics (furosemide, chlorthiazide and spironolactone) was not independently correlated with the onset of NEC.

CONCLUSIONS: NEC was more strongly correlated with postnatal age (DOL or PMA) than with GA at birth. NEC was most likely at PMA of 31-34 wk irrespective of GA at birth. The more immature infants were likely to develop NEC at later days of life. **Speculation:** Maturational issues relating to the gut or other immunological changes may play a role in the pathogenesis of NEC.

34 Fellow in Training

Prospective Randomized Control Trial of Restrictive Fluid Management in Transient Tachypnea of the Newborn

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BACKGROUND: Transient tachypnea of the newborn (TTN) is a self-limited respiratory distress syndrome of neonates. Otherwise healthy newborns with TTN require management in an intensive care setting, thus increasing length and cost of hospitalization and decreasing parent-child bonding in the first days of life. Although TTN accounts for a large percentage of late preterm and term neonatal intensive care unit admissions, little data underlie current management of TTN. This prospective randomized controlled trial compares fluid management strategies for neonates with TTN.

OBJECTIVE: To determine whether fluid restriction speeds resolution of respiratory distress in neonates with TTN.

DESIGN/METHODS: Late preterm and term neonates with TTN were randomized to either standard fluid management or restricted fluid management. Term infants received standard 60 mL/kg/day of intravenous (IV) fluids or restricted 40 mL/kg/day on day of life 1. Preterm infants received standard 80 mL/kg/day of IV fluids or restricted 40 mL/kg/day. Intravenous fluids

were increased by 20 mL/kg/day daily for all patients. The primary outcome was duration of respiratory distress, a composite outcome encompassing duration of tachypnea, hypoxia, and need for respiratory support. Secondary outcomes were length of time to first oral feed and time to discharge from the NICU.
RESULTS: Data from the 38 patients enrolled in the trial to date were included in this interim analysis. Twenty-four were preterm and 14 were term neonates. No adverse events due to fluid restriction occurred. No significant difference was seen between the two groups in duration of respiratory distress as measured by need for respiratory support. Babies who received fluid restriction in the first 72 hours of life had significantly shorter duration of admission in the NICU ($p<0.001$), however.
CONCLUSIONS: This interim analysis was not powered for statistical significance. However, duration of admission in the NICU was significantly decreased in fluid-restricted patients compared to patients receiving standard fluid management. This was a surprising finding, as there was no statistical difference in duration of respiratory support between the two groups. Inclusion of data from all patients enrolled at time of presentation will permit more complete evaluation of the benefits of fluid restriction in this patient cohort. This interim analysis demonstrates that fluid restriction benefits neonates with TTN.

35

Retrospective Study of Epinephrine Use in the Delivery Room Resuscitation of Infants Born ≤ 25 Weeks

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BACKGROUND: Practice varies widely with the use of epinephrine (epi) in the delivery room (DR) resuscitation of infants of borderline viability. There is very little evidence supporting the usefulness of or the futility of using epinephrine infants ≤25 weeks.
OBJECTIVE: To study the outcomes to discharge of infants ≤ 25 weeks gestation who received epi in the DR.
DESIGN/METHODS: Eligible patients were identified from the electronic database of the Women & Childrens hospital of Buffalo between January 2000 to Dec 2008 using the search terms epinephrine or cardiopulmonary resuscitation. Fourteen patients were matched to 28 controls for gestational age ±1week, birth weight ±100g, race and closest birth date. The outcome variables studied included incidence of hypotension, bronchopulmonary dysplasia, total number of days of mechanical ventilation, intraventricular hemorrhage, periventricular leukomalacia (PVL), necrotizing enterocolitis, number of days to full oral feeds and length of stay in the NICU. Chi square, Mann Whitney and ANOVA tests were used for statistical analysis. Power and sample size calculation (PS Power and Sample Size Calculator, Vanderbilt University) demonstrated that with 14 patients matched to controls 1:2 the study had 80% power to exclude a difference of 50% mortality between the epi treated and control infants with an α of 0.05.
RESULTS: There were no statistically significant differences in the mortality, or any of the short-term morbidities studied.

Baseline Characteristics & Results

	Epinephrine	Control	p
Gestational Age Weeks (SD)	24 4/7 (±4) days	24 4/7 (±4) days	
Birth Weight	707 ±102g	693±69g	
Antenatal Steroids (%)	46.5	50	NS
Apgar 1 & 5 minutes (median)	1 , 3	4, 7	<0.001
Cord pH	7.23	7.33	0.036
Worst Base Deficit on Day 1	7.19	7.25	NS
Hypotension (%)	35	44	NS
IVH Grade 3 or 4 (%)	21	32	NS
PVL (%)	18.5	5	NS
Ventilator Days	80	65	NS
Length of Stay (Days)	123	117	NS
Survived to Discharge (%)	64.3	67.8	NS

More babies had PVL in the epi treated group but this did not reach statistical significance.
CONCLUSIONS: The use of epi in the delivery room resuscitation of infants at the threshold of viability appears safe for all of the short-term outcomes studied in this small sample. Studies with more infants would be helpful to examine the incidence of PVL and long term neuro developmental outcomes of infants ≤ 25 weeks treated with epi during neonatal resuscitation.

36 Fellow in Training

How Often Are Very-Low-Birth-Weight (VLBW) Infants Normocarbic, Normothermic and Normoglycemic after Birth?

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BACKGROUND: Optimal respiratory management, thermoregulation, and maintenance of euglycemia in the period immediately after birth and resuscitation of VLBW infants is crucial, and directly related to their morbidity and mortality.
OBJECTIVE: (1) Determine how often the first measured partial pressure of blood carbon dioxide (PCO2), temperature, and blood glucose were in the optimal range in inborn VLBW infants (2) Identify factors associated with out-of-range values.
DESIGN/METHODS: We retrospectively reviewed charts of all consecutive inborn VLBW infants born between 1/1/2007 and 12/31/2008 for maternal and infant characteristics, perinatal management and infant physiologic measures. We defined optimal ranges as 35-65 mm Hg for PCO2, 36.5-37.5 degrees Celsius for temperature, and 40-150 mg/dL for blood glucose. We analyzed data using Stata 11.
RESULTS: The 110 VLBW infants born in the study period had a mean (SD) gestation of 28.7 (2.8) weeks and a mean (SD) birth weight of 1045 (300) grams. Of these infants, 46% were male, 73% were born by Cesarean section, 67% received a complete antenatal steroid course, and 69% received surfactant. The median (interquartile range, IQR) of the Apgar scores were 6 (3-8) and 8 (7-9) at 1 and 5 minutes respectively. In the first few hours of life 84% of infants had a blood gas sample, 95% a temperature measurement, and all a blood glucose measurement. At the time of the first blood gas, 90% were on mechanical ventilation or on continuous positive airway pressure. The first blood gas was obtained at a median (IQR) of 63 (48-95) minutes, and the first blood glucose at a median (IQR) of 48 (30-60) minutes after birth. The first documented value was in the optimal range for 73% of PCO2 values, 48% of temperature values, and 82% of blood glucose values. Hypocarbia was noted in 14% of infants, hypercarbia in 13%, and hyperthermia in 4%. There were no statistically significant differences ($p> 0.05$) in birth weight, gestation, antenatal steroids, delivery mode, and Apgar scores between infants with PCO2, temperature or glucose values within and outside the optimal range.
CONCLUSIONS: There was wide variation in the time of obtaining the first blood gas and blood glucose samples in inborn VLBW infants. Approximately a quarter of these babies had PCO2 levels outside the optimal range, half were hypothermic, and nearly one-fifth were hypoglycemic. There is a need for standardization and consistent early assessment and management of such infants.

37 Chief Resident

Reference Values for Nocturnal Oxygen Saturation in Healthy Preterm Infants

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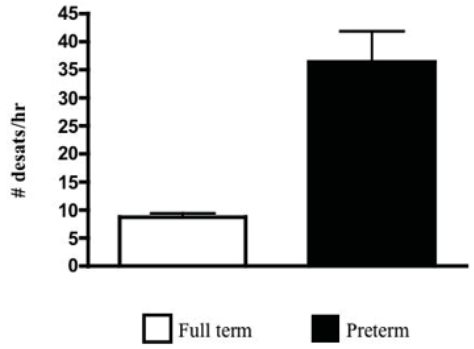
BACKGROUND: When weaning formerly premature infants from supplemental oxygen in the outpatient setting, most providers utilize nocturnal oximetry studies. However, reference values for nocturnal oxygenation in the appropriate comparison group, formerly premature infants who do not require supplemental oxygen at time of Neonatal Intensive Care Unit (NICU) discharge, have not yet been defined.
OBJECTIVE: The purpose of this study is to determine reference values for nocturnal oxygenation in preterm infants who do not require supplemental oxygen at time of NICU discharge in comparison with full-term healthy infants.
DESIGN/METHODS: Overnight recordings of oxygen saturation were obtained using a Masimo Rad 7 oximeter from convenience samples of healthy full-term infants and formerly preterm infants. The preterm infants met the following inclusion criteria: (1) Corrected gestational age 35-36 weeks, with gestational age at birth <= 32 weeks, a NICU stay of at least 7 days, without need for supplemental oxygen within the last 48 hours and without future anticipated need for supplemental oxygen. Data was analyzed using ProFox software. A minimum of 7 hours of valid recording time was required for analysis. Percentage of time spent less than specific target saturation levels and number of desaturation episodes were determined.
RESULTS: This data represents 80% of the anticipated cohorts. We obtained data from 79 full-term infants and 49 preterm infants. Baseline SpO2 values for full term and former pre-term infants were similar, but former pre-term infants had significantly more intermittent brief desaturations (Figure 1, $p<0.0001$).

Figure 1



CONCLUSIONS: When weaning preterm infants from supplemental oxygen, the total percentage of time above the saturation levels utilized in our study can be used as a guideline for reference standards. The clinical relevance of the increased desaturation episodes seen in the preterm infants compared to full-term infants requires further study.

38

NICU Redesign from Open Ward (OW) to Private Room (PR): A Longitudinal Study of Parent and Staff Perceptions

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BACKGROUND: PR NICU design is increasing being used in place of OW. Previous studies have examined perceptions of staff members but little has been reported on family perceptions of PR versus OW design.
OBJECTIVE: To assess perceptions among NICU parents and staff regarding patient care and facility components in OW versus PR designs.
DESIGN/METHODS: Parents and staff in a Level III NICU were surveyed before patients were moved from OW to PR in 2009. Post-move surveys were done at 1 and 8 months. Normality of data was assumed; mean scores were compared by t-tests.
RESULTS: 248 surveys were completed. In an OW, parents and medical staff were relatively satisfied with Team function. After 1 month in the PR, MD/NNPs reported higher overall scores whereas RNs reported declines in Team function and Safety but gains in Development, Facility, and Privacy. Parents reported uniformly higher scores with the PR versus OW. MD/NNP scores did not significantly vary between 1 and 8 months in the PR. RNs were initially satisfied with the PR but by 8 months, their scores declined. Parent satisfaction was consistently higher than staff in both settings.
CONCLUSIONS: Higher parental satisfaction is likely due to focus on the infant rather than facility. In the PR epoch, lower RN scores are likely due to less interaction with peers that MS do not appreciate. Further research is needed to evaluate both groups.

Epoch	Group	Team	Communication	Development	Safety	Facility	Privacy
OW Pre-move	Parent	8.3 (0.2)	* 8.8 (0.1) ^	* 9.0 (0.1) ^	* 9.4 (0.1)	* 8.4 (0.2) ^	* 6.5 (0.4) ^
	Nurse	8.1 (0.2) ^	* 7.6 (0.1)	* 6.4 (0.2) ^	* 8.5 (0.1) ^	* 5.4 (0.2) ^	* 4.3 (0.3) ^
	MD/NNP	8.2 (0.2)	* 7.5 (0.2) ^	** 5.4 (0.3) ^	** 7.8 (0.3)	** 4.5 (0.4) ^	* 4.8 (0.5) ^
PR Transition (1m)	Nurse	* 6.9 (0.2) ^	* 7.4 (0.1)	7.4 (0.1) ^	7.9 (0.2) ^	8.4 (0.1) ^	7.7 (0.2) ^
	MD/NNP	* 8.2 (0.2)	* 8.3 (0.1) ^	7.7 (0.2) ^	8.2 (0.3)	8.4 (0.3) ^	7.9 (0.3) ^
PR Post-move (8m)	Parent	* 8.8 (0.3)	* 9.3 (0.1) ^	* 9.6 (0.1) ^	* 9.6 (0.1)	* 9.6 (0.1) ^	* 9.4 (0.2) ^
	Nurse	* 7.4 (0.2)	** 7.3 (0.1)	* 7.1 (0.2)	* 8.1 (0.2)	* 7.9 (0.2) ^	* 8.1 (0.2)
	MD/NNP	8.2 (0.3)	** 8.2 (0.1)	* 7.4 (0.2)	* 8.1 (0.2)	* 7.8 (0.2)	* 7.5 (0.5)

Mean (SEM). * p<0.05 within Epoch. ^ p<0.05 within Group.

39 House Officer

Compliance of Pediatricians at an Urban Community Hospital with American Academy of Pediatrics Guidelines for Screening of Autism Spectrum Disorders before and after Educational Intervention

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Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Department of Psychology, Touro College, New York, NY.

BACKGROUND: The American Academy of Pediatrics (AAP) recommends that all children be screened for ASD at 18-month (m) and 24- m well- child visits (WCV) with a standardized screening tool like Modified Checklist for Autism in Toddlers (M-CHAT). There are limited data on which active interventions would increase the compliance of screening for ASD.

OBJECTIVE: To evaluate the screening for ASD by the pediatricians (P) at a community hospital before and after publication of AAP guidelines and then after educational intervention (EI) with grand rounds by a developmental pediatrician (DP) at the hospital.

DESIGN/METHODS: This was a retrospective, observational study by chart review of the WCV of children at 18 m and 24 m. Patients were divided into 3 groups: Group 1 (G1- May 07 to Oct 07), prior to AAP guidelines; Group 2 (G2- Nov 07 to April 08), after Nov 07 AAP guidelines; and Group3 (G3- May 08 to Sept 09), after educational intervention in May 08 by DP. Data were analyzed using frequency tables and chi square analyses with p value less than 0.05 considered significant for the following categorical variables: age, pediatricians alone/with trainees, developmental concerns and specialist referral (DP/Neurologist).

RESULTS: Of the total 199 subjects, having educational intervention increased the number of MCHATs done at 18 m from 0% in G1 (N=90) and G2 (N=47) to 7 (14%) in G3 (N=50),which was statistically significant($p<0.001$). Having EI increased the number of MCHATs done at 24 m from 0% in G1 (N=47) and G2 (N=53) to 14 (15%) in G3 (N=89),which was statistically significant($p<0.001$).At 24 m, if the pediatrician had developmental concerns about the child, the number of MCHATs done were increased ($p=0.027$), but no difference was noted at 18 m. At 24m, positive M-CHAT screens increased referral to a DP/ Neurologist ($p=0.026$). In children who had MCHATs done, there were no significant differences whether they were seen by the attending alone or with a trainee.

CONCLUSIONS: Publication of AAP guidelines had impact on screening of ASD after educational intervention.Other strategies are needed to further increase the compliance.

40

Parental Assessments of Quality of Life of Adolescents with Autism Spectrum Disorders

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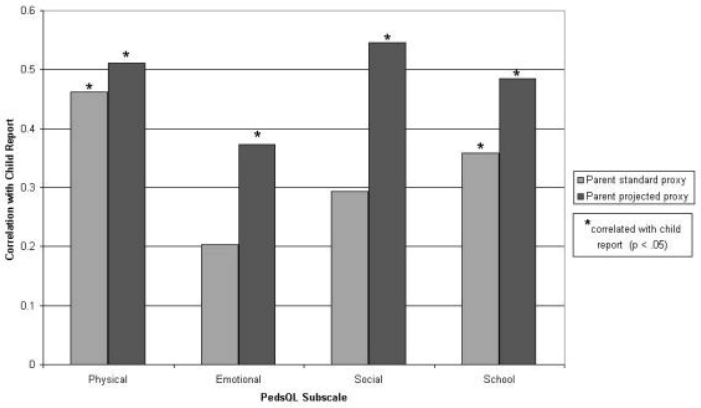
BACKGROUND: When completing Quality of Life (QoL) questionnaires as proxies for their children, parents often ask whether they should answer questions based on their own judgment or as they believe their child would respond. As part of a larger study that demonstrated the validity of self-reported QoL among adolescents with autism spectrum disorders (ASDs), we compared parents' ratings of their child's QoL first as a standard proxy, in which they responded to the questions based on their own evaluation of the adolescent's well being, and then as a "projected proxy," imagining how their child would answer the same questions. Previous research using standard parent-proxies has shown only moderate concordance, at best, between adolescent self-report and parent-proxy report of QoL.

DESIGN/METHODS: Data were collected from 39 adolescents (ages 13-18) with ASDs, and one of each adolescent's parents. Adolescents were asked to complete the PedsQL, generic form, and parents were asked to complete the measure twice, first as a standard proxy and second as a projected proxy. A 2-tailed Pearson's correlation was performed comparing the parent's standard and projected QoL evaluations with those of their child.

RESULTS: Adolescents' responses were more strongly correlated with parents' projected proxy reports than with standard proxy reports for all QoL subscales [see Figure]. Additional regression analyses using the child's report as the dependent variable and both parent reports as independent variables, showed the parent's standard report to be non-significant in every case.

Figure: Correlation between child report on PedsQL, parent standard proxy and parent projected proxy



CONCLUSIONS: There is a higher degree of concordance between adolescents' self-reports of QoL and parents' evaluations when parents answer as they predict that their child would answer, than when asked to report their own opinions. These findings suggest that future parental evaluations of adolescents' QoL, at least in this population, may more accurately portray adolescent's opinions if framed as a projected proxy.

41 Resident in Training

Exposure of Child and Adolescent Psychiatry Fellows to Autism Spectrum Disorder

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BACKGROUND: In the last decade, there has been an increase in Autism Spectrum Disorder (ASD) cases throughout the nation. With increased concern from parents about their children having autism, they will turn to health professionals such as child and adolescent psychiatrists, pediatricians and neurologists more often for ASD evaluation and treatment. However, standards have not been developed for training child psychiatry fellows in the care of children with ASD.

OBJECTIVE: To survey child and adolescent psychiatry fellows across the nation about their level of confidence, education and clinical experience about ASD.

DESIGN/METHODS: We conducted a cross sectional survey of all child and adolescent psychiatry fellows training in the United States. Program directors asked fellows to participate in an online anonymous questionnaire about their formal training, clinical exposure, and level of confidence in identifying, treating and accessing services for children with ASD.

RESULTS: Overall 101/781 fellows (12.9%) responded: 51 were 1st year, 50 2nd year. Faculty training the fellows in ASD included a child psychiatrist 95%, plus a developmental pediatrician 35%, a child neurologist 28% or a child psychologist 47%. Exposure to ASD patients was provided at an autism clinic in 50%, a child psychiatry clinic in 36% and other settings in 11%. Regarding their clinical exposure to children with ASD in a 6-month period, 36% of fellows treated 1-5 patients, 23% treated 6-10, and 37% treated >10 patients. The results also show heterogeneous responses of the amount of ASD patients they are assessing during fellowship. 13.9% reported seeing over 21 ASD patients and yet a significant percentage (35.6%) reported seeing only 1-5 ASD patients over a 6-month period. Nearly half of fellows had 4 lectures on ASD, and 1/5 had >11 lectures. The survey revealed the majority of fellows felt confident in diagnosing (82%), treating (68%) and providing services (58%) for ASD patients. Fellows that reported the highest confidence level in treating ASD also reported minimal clinical exposure to ASD patients, 31.7% of these fellows evaluated only 1-5 patients over a 6-month period.

CONCLUSIONS: Currently, formal training and clinical exposure to children with ASD in child psychiatry fellowships is highly variable. The results seem to suggest high confidence levels even with limited clinical exposure. Development of standards and practices in educating psychiatric fellows about ASD should be considered.

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Factors Affecting Parental Mental Health Treatment Initiation in Children and Adolescents

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BACKGROUND: Many parents and guardians fail to follow up on mental health referrals for their children resulting in a crisis or emergency when the child's problems escalate. Most literature has focused on the mental health treatment process and outcomes without examining barriers preventing caregivers from making the initial contact with a mental health care provider.

OBJECTIVE: To examine barriers that influence caregivers from initiating contact with a mental health referral following a primary care visit with a pediatrician or clinical social worker.

DESIGN/METHODS: Caregivers of children 2-18 years of age, who were initially seen by their primary care physician and then referred for mental health services, were contacted by phone 3 weeks after their initial pediatric appointment and were asked to participate in a single phone survey session. Data were collected over a one year period using a modified version of Kazdin's *Barriers to Treatment Participation Scale-Parent*, which examines the caregiver's perceptions of the barriers to initiating contact with a referral.

RESULTS: Reasons for mental health referrals are listed in Table 1.

Table 1

Mental Health Referrals	Total Numbers
Behavior	31
Attention	24
Depression	17
Anxiety	11
Anger	28
Sleep	12
Toileting	6

*Numbers are greater due to multiple reasons for referral.

Of 190 eligible subjects, 134 could not be reached for follow-up because of disconnected phones, invalid numbers or unreturned phone calls. A principal components analysis (with Varimax rotation) was conducted to examine the overall structure of barriers, revealing three factors related to structure, resource and need issues. A logistic regression comparing contact with a referral to the three factors indicated that for each standard unit increase in caregivers' perceptions of the need for mental health services, participants were 2.53 times more likely to initiate contact with a referral.

Table 2

Logistic Regression				
Barrier	***B***	**Wald**	**Odds Ratio**	***P* value**
Structure	.22	.67	-	NS
Resource	.12	.09	-	NS
Need	.93	6.37	2.53	.05

*NS = non-significant

CONCLUSIONS: The first step to seeking out mental health services is initiating contact with a mental health provider. External barriers appear less important to caregivers than the internal barrier of perceived need for mental health services. Future research could examine caregivers' perceptions of the need for or benefits of seeking mental health services.

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The Role of a Community Hospital in Implementing a School-Based Seasonal Influenza Vaccination Project in the South Central Bronx

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BACKGROUND: Influenza (flu) vaccination rates reveal that only 8.9% of children between the ages of 2-17 without a high-risk condition receive their annual flu vaccine. Several studies have shown that conducting school-based flu clinics may represent an alternate strategy to increase vaccination rates and provide herd immunity.

OBJECTIVE: 1) To design and implement a school-based flu vaccination program through a community hospital in 8 South Central Bronx primary and middle schools. 2) To immunize 20% of students in these 8 schools.

DESIGN/METHODS: The Department of Education assisted in identification of 8 primary and middle schools in close proximity to Bronx-Lebanon Hospital. Once schools were identified and partnerships established, consent forms (English, Spanish and French) were distributed at back-to-school nights and given to schools to send home with students. Vaccine history of each consented child was verified in the New York Citywide Immunization Registry (CIR). School flu clinics occurred between 10/9/09-11/6/09. Intranasal and killed vaccines were administered as indicated by a small team of practitioners while 3-5 staff/volunteers from the hospital's Community Health Education Center provided administrative support. After each flu clinic, all vaccine doses were entered into the CIR. The Department of Health and Mental Hygiene, Bureau of Immunization, NYC provided medical supplies, vaccine, and program development support.

RESULTS: Of 5,186 students enrolled in all 8 schools, 1,340 (26%) returned consent forms and 854 (16.5%) were vaccinated. An additional 163 doses were administered to teaching staff, yielding a total of 1,017 flu doses given over a 28-day period. Consent form return rates ranged from 10%-59%, while vaccination rates ranged from 7%-38% in each school student population. The disparity between consent form return rates and vaccination rates is due to students who had already received the vaccine (31%), parents who refused the vaccine (23%), incomplete forms (15%), forms turned in late (14.4%), absenteeism (10%), and others (6.6%).

CONCLUSIONS: Using a local hospital as an intermediary when implementing a school-based influenza vaccination project is an effective strategy in a diverse, low-income community. Support from and partnership with the Departments of Health and Education helped ensure an optimal outcome.

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Fellow in Training

Estimating Validity and Accuracy of Vaccine Recall

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BACKGROUND: Vaccines are often given during a limited period and the chance of receipt from multiple immunization providers does exist. Physicians may use verbal report to determine vaccination status of their patients and often researchers rely on parental (or self) report of vaccination as documentation. Further data on the accuracy of parental or self-recall of recommended vaccines are needed.

OBJECTIVE: To assess the validity and accuracy of parental and self vaccination recall as compared with vaccine information documented in medical record by time elapsed fro when the subject was first eligible to receive vaccine. Vaccines evaluated included rotavirus, influenza (during pregnancy), and varicella. Secondary aims include the evaluation of vaccine recall with regards to socio-demographic information, type of pediatric practice attended, and parental perceptions toward vaccination.

DESIGN/METHODS: Vaccine data and demographic information obtained from interviews and reviews of medical records were previously collected as part of ongoing case control vaccine effectiveness trials conducted from 1997-2009. Recall time(RT) was defined as the time elapsed between the first eligible opportunity for vaccination and the interview. Accuracy of recall estimates were assessed by calculating concordance(C), sensitivity(Se), specificity(Sp), positive predictive value(PPV), negative predictive value(NPV), and kappa statistics(k) to measure agreement between sources.

RESULTS: Of 3574 subjects considered to date, 216 (6%) were excluded because the interviewee did not know the subject's vaccination status. For reliability of recall in 140 subjects reporting rotavirus vaccine status, C was measured at 83.6%, Se of 88.6%, Sp of 81.3%, PPV of 68.4%, NPV of 94%, and a k of 0.647. Agreement between sources was greatest for subjects with a shorter RT. Reliability of parental report for varicella vaccination (N= 2967) was higher (C 97.1%, Se 97.8%, Sp 93.1%, PPV 98.8%, NPV 87.7%, and a k of 0.886). Reliability of report of influenza vaccine received during pregnancy (N=251) was substantially lower (C 80.1%, Se 94.3%, Sp 77.8%, PPV 40.7%, NPV 98.8%, and a k of 0.465). Of note, mothers of infants hospitalized with influenza less accurately reported influenza vaccination compared to mother of infants hospitalized for other reasons (PPV 20.8% v 49.1%).

CONCLUSIONS: While parental and self vaccine recall was reasonable, there were differences in validity and accuracy by vaccine type.

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Effect of Massage on Methadone Exposed Infants, RCT

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BACKGROUND: There has not been a study on the effect of massage for infants withdrawing from Methadone exposure although it improved weight gain and behavior for preterm infants.

OBJECTIVE: To see the utility of massage for neonates withdrawing from Methadone exposure.

DESIGN/METHODS: Infants are enrolled as preterm(PT:35-6 weeks) or full term(FT:37-42 Weeks) at 2 sites. Infants requiring Morphine to captured dose are given Phenobarbital loading of 10 mg/kg twice followed by maintenance at 2.5 mg/kg q12h. Infants are randomized after the loading either to massage+SC(M) or standard care(SC) alone once a day 5 times a week till weaning of morphine. Data are analyzed on LOS, NAS scores, the rate of decrease on morphine dose and NICU Network Neurobehavioral Scale(NNNS) summary scores. Statistical methods are general linear modeling, survival analysis and hierarchical linear modeling.

RESULTS: N=73 at the completion of the study. Demographics:two groups are comparable in numbers of male, GA, BW, HC, Apgars, 2 NAS scores before morphine, maternal Methadone dose, age, parity, education level, smoking and other drug use except cocaine. 1. Overall LOS was shorter for M group(P=0.04) due to PT with covariates of maternal Methadone dose, use of benzodiazepine and smoking. 2. The rate of decrease on Morphine was faster for PT M group(P=0.004). 3. There was no difference on peak daily NAS scores for M and SC groups. 4. There was no difference between M and SC groups among FT on NNNS summary scores with covariates on sites. 5. Phenobarbital and Morphine improved quality of movements, hypertonicity and excitability in FT(P<0.05). They improved regulation in all groups but not stress/abstinence. 6. M improved attention in PT only after 5 massages.

CONCLUSIONS: In PT, massage shortened the LOS. In FT, LOS were comparable among M and SC. LOS was not related to maternal Methadone dose. The rate of decrease on Morphine was more rapid for PT massage group than for SC. The rate of decrease was not significant among M and SC in FT. There was no difference on NNNS summary scores among M and SC in FT. Morphine and Phenobarbital affected PT and FT differently on NNNS summary scores. Massage improved attention in PT only.

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Provider Acceptance of Universal Depression Screening

John Rausch, William Rausch, Karen Soren.

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BACKGROUND: Adolescent depression is common with serious outcomes. The U.S. Preventive Services Task Force recently recommended annual depression screening by primary care providers for all 12–18 year olds. Despite these recommendations, it is unclear how receptive providers will be to implementing screening due to time pressures and a lack of mental health providers.

OBJECTIVE: To identify the provider acceptability of universal screening for adolescent depression in pediatric primary care practices at an academic medical center.

DESIGN/METHODS: Over a 6 month period (July-December 2008) 598 patients aged 13 to 20 presenting to 3 pediatric primary care practices in an academic medical center were screened for depressive symptoms using the bilingual Columbia Depression Scale (CDS) at well and acute visits. A provider pre-survey (n=34) was conducted using 15 close and open ended questions to assess providers' attitudes toward mental health screening and their beliefs on barriers to such screening and treatment. A post survey (n=30) was completed 4 months after the screening concluded and included the original questions plus 10 additional questions on CDS usage. Percentages were calculated and Fischer's Exact Tests were utilized to determine changes in providers' attitudes.

RESULTS: Forty- three providers utilized the CDS to screen patients and the same number filled out at least one survey with 21 filling out both a pre and post survey (60% residents). Prior to implementation of CDS screening, all providers felt it was their duty to identify mental health problems, but 35% were uncomfortable or uncertain about their comfort addressing adolescent depression. After the screening study, only 23% felt uncomfortable or uncertain ($p< 0.05$). Further, 4 months after the study, 50% of providers reported continuing to use the CDS at least at all well adolescent visits. Only 10.7% reported felt strongly that the CDS took too much time during a well adolescent exam, and 100% reported that they would like to continue using the CDS. Finally, 50.6% of providers felt that there was at least moderate enhancement of the relationship between providers and patients after screening.

CONCLUSIONS: Primary care providers seemed to be receptive to depression screening during well adolescent visits, and implementation of screening appears to increase provider comfort addressing adolescent depression and had a positive impact on the patient-provider relationship. More work is required to make screening more efficient and sustainable.

Neonatology - Pulmonology Platform Session

Saturday, March 27, 2010
8:15 AM-10:30 AM

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Urogenital Symptoms in Pre-Menarchal Girls: Prevalence and Associations

Cynthia W. DeLago, Carmen V. Vasquez, Claudia Clarke.
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BACKGROUND: Pre-menarchal girls with dysuria, genital soreness, pruritus, bleeding or vaginal discharge are diagnosed with vulvovaginitis when no other cause is found. A wide variety of chemical and mechanical irritants have been attributed to it, but no published studies describe prevalence, relationship to irritants/medical conditions.

OBJECTIVE: Describe prevalence and associated factors of urogenital symptoms in pre-menarchal girls.

DESIGN/METHODS: We surveyed 5-12 yr-old girls and their parents arriving for well-child visits at an urban, hospital-based pediatric office. Girls and their parents were questioned separately about past urogenital symptoms and perceived causes. Girls' history of eczema, other medical conditions and medications, and exposure to genital irritants over the past year (tight-fitting underwear/pants/bathing suits, nylon underwear, bike or horseback riding, bubble baths, soap, shampoo, genital hygiene, and genital trauma) were obtained from the parent. We explored associations between genital irritants, medical conditions and urogenital symptoms.

RESULTS: One hundred thirty-seven 5-12 yr-old girls arrived consecutively for well-child visits July-August, 2009. 106 were pre-menarchal and consented. Parents of 24 girls reported their daughters ever had urogenital symptoms not attributed to medical conditions or trauma (prevalence: 23%); however, 48 girls reported ever having urogenital symptoms (prevalence: 45%). Most parents (30%) and girls (44%) could not identify a cause for the symptoms; of those that could, symptoms were attributed to poor hygiene (27% parents, 30% girls) and soap on the genitalia (21% parents, 12% girls). Genital irritant exposures most associated with parents' reports of girls' genital pruritus were: wearing tight underwear/pants/bathing suits; genital exposure to soap; and poor genital hygiene (all $p<0.01$, Fisher's Exact test). Genital irritant exposures most associated with girls' reports of genital soreness were soap and poor genital hygiene (all $p<0.01$, Fisher's Exact test). No association between parents' or girls' symptom reporting and eczema was found.

CONCLUSIONS: Urogenital symptoms are common in pre-menarchal girls and are associated with wearing tight underwear/pants/bathing suits, soap exposure and poor genital hygiene. Eczema was not associated with symptom reporting. Understanding factors associated with urogenital symptoms can help health care providers prevent and treat this problem.

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Urogenital Symptom-Reporting: Sexual Abuse vs. Exposure to Genital Irritants in Pre-Menarchal Girls

Cynthia W. DeLago, Claudia Clarke, Martin Finkel.
Pediatrics, Albert Einstein Medical Center, Philadelphia, PA; Pediatrics, University of Medicine and Dentistry of New Jersey-School of Osteopathic Medicine, Stratford, NJ.

BACKGROUND: Diagnosis of sexual abuse is often based on girls' histories describing idiosyncratic details, such as symptoms related to abuse (dysuria, genital soreness, pruritus, vaginal discharge or bleeding). These symptoms also occur after exposure to genital irritants.

OBJECTIVE: Explore frequency/type of urogenital symptoms reported by pre-menarchal girls after inappropriate genital contact vs. genital irritant exposure.

DESIGN/METHODS: We surveyed 5-12 y/o girls arriving for sexual abuse exams (abuse group) at a regional abuse referral center and girls arriving for well-child exams at an urban pediatric office (control group). Girls disclosing inappropriate genital contact before menarche (abuse group) and pre-menarchal girls having recent exposure to a genital irritant (control group) were included. Parents were separately asked about their child's overall and most recent genital irritant exposure and history of urogenital symptoms. Girls were asked scripted, open-ended questions to elicit symptoms temporally related to abuse or genital irritant exposure.

RESULTS: 24 /104 (abuse group) and 107/153 (control group) girls met inclusion criteria. Both groups had similar mean ages (8.5 yrs, SD 2.3, range 5.3-12.6 yrs.[abuse] vs. 7.9 yrs, SD 2.1, range 5.0-12.5 yrs [controls]), and prevalence of eczema, 21% vs. 26%. Genital exposures for nylon underwear, bubble baths, soap, horseback riding, genital trauma and poor hygiene were similar in both groups, but more girls in the abuse group had exposure to tight underwear/pants/bathing suits, 67% vs. 27%, shampoo, 25% vs. 4%, and bikes, 92% vs. 74%. When asked how her genitalia felt after inappropriate contact or genital irritant exposure, 79% of abuse girls vs. 35% of controls stated it felt bad, hurt, burned, stung, or itched. When asked if it bothered her body, feelings or both, 8% of abuse girls said it bothered her body only and 54% said it bothered both; 33% of controls said it bothered her body and 1% said it bothered both. When asked if it hurt to do anything after, 29% of abuse girls said it hurt to urinate vs. 14% of controls.

CONCLUSIONS: When girls are asked specific open-ended questions about genital symptoms temporally related to inappropriate genital contact vs. genital irritant exposure, sexually abused girls describe more symptoms than girls exposed to genital irritants, further supporting the value of taking a medical history when examining girls for possible sexual abuse.

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Fellow in Training

8:15 AM

Pulmonary Hemodynamics in Asphyxiated Lambs Resuscitated with 21% and 100% Oxygen

Fabio J. Savorgnan, Daniel D. Swartz, Bobby Mathew, Karen A. Wynn, Rita M. Ryan, Satyan Lakshminrusimha.
Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: The optimal oxygen concentration during resuscitation post-asphyxia is unknown. Oxygen is a potent and specific pulmonary vasodilator. Previous studies evaluating pulmonary hemodynamics with 21% and 100% oxygen in asphyxiated animals were conducted in 1-3 day old piglets in which the pulmonary vascular resistance (PVR) has already decreased postnatally. The effect of 21% oxygen resuscitation at birth in asphyxiated hypercarbic animals with high PVR is not known.

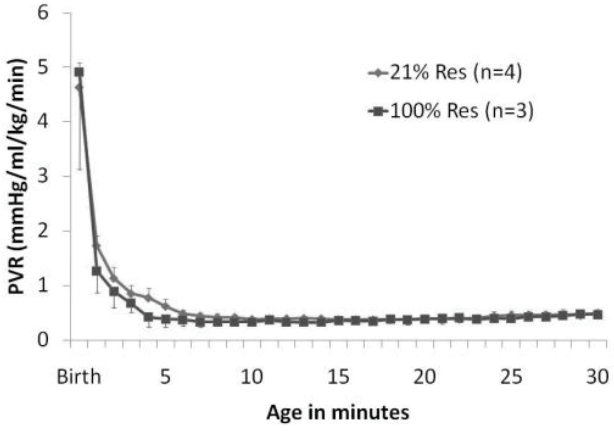
OBJECTIVE: To evaluate changes in pulmonary hemodynamics following acute asphyxia by umbilical cord occlusion and resuscitation with 21% and 100% oxygen at birth.

DESIGN/METHODS: Term fetal lambs (141d) are partly exteriorized and instrumented to measure systemic blood pressure (SBP) and PVR. The umbilical cord is occluded and blood gases, PVR, SBP, heart rate, and arterial saturation are monitored every 1-2 min for 10 min or until heart rate decreases below 60 beats/min, whichever is earlier. The lamb is then mechanically ventilated for 30 min with either 21%, or 100% oxygen and blood gases, SBP, PVR are monitored.

RESULTS: Nine lambs were instrumented and underwent asphyxiation by cord occlusion; 2 lambs died. Cord occlusion for 10 min results in hypercarbia and acidosis (pH 6.99±0.07, pCO2 101±14mmHg) with increased PVR. Resuscitation resulted in rapid decrease in PVR. Resuscitation with 21% or 100% oxygen ventilation resulted in marked differences in PaO2 but the decrease in PVR was similar in both groups.

Arterial Blood Gases

	21%			100%		
	pH	pCO2	pO2	pH	pCO2	pO2
Fetal (prior to cord occlusion)	7.33±.03	49±5	21±4	7.32±.03	50±5	20±1
After cord occlusion	7.02±.1	97±14	5±5	6.94±.1	109±31	9±3
5min resuscitation	7.31±.02	39±5	89±19	7.14±.11	58±18	445±58
30min resuscitation	7.24±.12	36±2	52±13	7.26±.04	42±2	459±62



CONCLUSIONS: In asphyxiated lambs with hypercarbia and pulmonary hypertension, 21% oxygen resuscitation at birth results in similar fall in PVR as 100% oxygen.

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Medical Student

8:30 AM

Transit In Utero Knockout (TIUKO) of the Cystic Fibrosis Conductance Regulator (ASCFTR) Alters the Cytokine Response to Birth Hyperoxia in the Lungs of Sprague-Dawley Rat Pups

Rachael Grodick, J. Craig Cohen, Shetal Shah.
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BACKGROUND: CFTR is integral to stretch-induced growth and development. Transient expression of antisense-CFTR (ASCFTR) results in decreased respiratory function, altered surfactant homeostatsis & increased fibrosis in rats. Hyperoxia decreases lung function by causing oxidant stress, inflammation, and re-modeling.

OBJECTIVE: To determine the effect of birth hyperoxia on the levels of tumor necrosis factor alpha (TNF-alpha), Interleukins 1 Beta (IL-1B), 2 (IL-2), 4 (IL-4), 6 (IL-6) and 8 (IL-8) in the lungs of Sprague Dawley rats.
DESIGN/METHODS: Four groups of time-pregnant Sprague-Dawley rat pups underwent transient in utero knockout of CFTR by anti-sense CFTR (ASCFTR) using a replication-deficient, adeno-associated virus vector at 16 days gestation or Expressed Green Flourescence Protein (EGFP) control. Dames delivered naturally & litters were placed in either room air or 100% hyperoxia for 24 hours after birth & recovered in room air. Lungs were harvested immediately after hyperoxia and on day of life 28. Immuno-histochemistry was performed on frozen sections to assay for levels of TNF-alpha, IL-1B, IL-2, IL-4, IL-6 and IL-8. Pixel count was used via quantitative confocal microscopy from 20 microscopic images per antibody. ANOVA testing with Bonferroni Correction was used to determine significance.
RESULTS: Lung TNF-alpha levels were elevated after hyperoxia in the EGFP group on DOL 1 ($p<0.003$) but not the ASCFTR group. By DOL 28, both hyperoxia groups were below control ($p<0.0001$). IL-1B levels were increased after hyperoxia on DOL 1 in both the ASCFTR and EGFP groups ($p<0.0001$ for both), but remained elevated in the ASCFTR group by DOL 28 ($p<0.0017$). IL-4 levels were increased in response to hyperoxia on DOL 1 but decreased in the ASCFTR group ($p<0.001$, both). The ASCFTR group exhibited higher lung IL-4 than EGFP ($p<0.001$). By DOL 28, this difference normalized. Lung IL-6 w asdecreased on DOL 28 in the EGFP group ($p<0.0008$). Lung IL-2 levels were increased in response to hyperoxia in the EGFP group on DOL 1. IL-8 levels in the ASCFTR animals were increased on DOL1 after hyperoxia compared to control but decreased by DOL 28 ($p<0.001$ for both).
CONCLUSIONS: Disrupted lung organogenesis caused by TIUKO of the CFTR gene results in an abnormal inflammatory response to hyperoxia in the lung of Sprague-Dawley rats. This altered response only partially normalizes with time.

51 High School Student

8:45 AM

Does Epigenetics Play a Role in Bronchopulmonary Dysplasia?

Jayanth Kocherlakota, Kristen Aland, Johanna Calo, Vanessa Mercado, Lance A. Parton.
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BACKGROUND: Epigenetics is the study of phenotypic changes, which occur even in the absence of changes to the underlying DNA sequence. Histone deacetylase (HDAC) represses gene expression by condensing histone tails around DNA following the removal of acetyl groups. In adults with COPD, low HDAC activity in lung macrophages, lung biopsies, and circulating leukocytes has been associated with enhanced inflammation and reduced steroid-responsiveness. We wondered whether a parallel process might be responsible for pulmonary changes seen in ELBW infants with BPD.
OBJECTIVE: We hypothesize that preterm infants at risk for BPD will have decreased pulmonary expression of HDAC.
DESIGN/METHODS: Infants (N=25) weighing less than 1 kg at birth, without major congenital defects or chromosomal anomalies were recruited. Tracheal aspirates (TA) were obtained within the first week of life. Replicate HDAC levels in TAs were determined by colorimetric assay, by comparison to known concentrations. Demographic data were analyzed by ANOVA for continuous variables, and chi-square for categorical data. $P<0.05$ was considered statistically significant.
RESULTS: Birth weights were (mean±SD): 755±143, 691±125, and 725±192 for Mild (N=6), Moderate (N=7), and Severe (N=12) BPD, respectively (P=0.8). Gestational ages were: 25±1, 26±1, and 26±2, respectively (P=0.4). No significant differences in demographics were found. HDAC levels are shown in Table 1.

HDAC and Severity of BPD

	Mild BPD	Moderate BPD	Severe BPD
1	18.9	17.1	11.6
2	13.9	14.8	21.1
3	23.4	29.3	18.6
4	16.5	59.9	13.4
5	14.9	19.8	26.1
6	15.4	16.6	30.9
7		23.1	15.5
8			17.3
9			15.5
10			24.0
11			28.6
12			13.1
Mean±SD	17.2±3.5	25.8±15.8	19.6±6.4

The HDAC levels were not different between the 3 severities of BPD (P=0.4).
CONCLUSIONS: All ELBW infants with BPD manifested low pulmonary HDAC expression during the first week of life, regardless of the severity of BPD. This may represent the normal developmental expression of HDAC in these extremely preterm infants. However, this finding is consistent with the findings of low pulmonary HDAC in adults with COPD. We speculate that epigenetic factors such as HDAC may play a role in the pathogenesis of BPD in ELBW infants.

52 Fellow in Training

9:00 AM

Structural and Functional Changes in Neonatal Sprague Dawley Rats Lungs Exposed to Antenatal Magnesium Sulfate

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BACKGROUND: Magnesium has been used to treat maternal hypertension and has been used as a tocolytic agent in preterm labor. Clinical observation demonstrate fetal exposure of cumulative higher doses of magnesium and has been correlated with pulmonary interstitial emphysema and poor neurodevelopmental outcomes. No studies have shown the effects of pulmonary function and structural changes in the developing lung after antenatal exposure to magnesium in animal models.
OBJECTIVE: Antenatal magnesium administration improves lung function in postnatal period and induces structural and functional changes in the developing lung.
DESIGN/METHODS: Timed-pregnant sprague dawley rat dames were administered two (0.04 mg and 0.4mg) different doses of magnesium into amniotic sac at gestational age e16. Respiratory function testing were performed on day 9,10 and 11 at 3 different levels of positive end expiratory pressures (PEEP) of 0, 3, and 6 cm H_20. Unpaired T test was used to compare the data. Immunohistochemistry was performed on rat lungs, gestational age e16 that were exposed to antenatal magnesum at two (0.04mg and 0.004mg) different doses. Slide Book software was used for deconvolution and quantication.
RESULTS: Administration of 0.04mg of magnesium resulted in survival of pups. Administration of 0.4mg of magnesium was uniformly fatal in the fetal period. The respiratory function showed marked increase in airway resistance and tissue dampening. There was no statistically significant differences in static compliance or histerisity. The increase in airway resistance was noted in all levels of PEEP(0,3,and 6) with a P value 0.001. Elastance increased at a PEEP(0,3)with a P0.001 and P0.05 at PEEP of 6. Tissue dampening increased in all level of PEEP (0,3 and 6) P0.001 at PEEP 0 and 3 correlates with decrease in compliance. The immunohistochemistry studies showed decrease uptake of the phosphorylated myosin light chain (MLC) with increasing levels of magnesium.
CONCLUSIONS: We conclude that rat pups exposed to antenatal magnesium at a dose of 0.04mg show more mature lung state compared to the controls. Based on magnesium and calcium antagonism and the principles of stretch induced lung disease, we theorize the inhibition of calcium by magnesium, leads to decreased activation in the developing airway. The decreased uptake of phosphorylated MLC demonstrates the antagonizing effects of magnesium on calcium.

53 Medical Student

9:15 AM

Mitochondrial Superoxide Dismutase Polymorphism and the Susceptibility for Bronchopulmonary Dysplasia

Edward Hurley, Kristen Aland, Johanna Calo, Lance A. Parton.
Pediatrics, New York Medical College, Valhalla, NY; Division of Newborn Medicine, Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: Oxidative stress, along with genetic factors and mechanical ventilation, has been implicated in the susceptibility of preterm infants to bronchopulmonary dysplasia. Manganese superoxide dismutase is an important enzyme for quenching reactive oxygen species. It catalyzes the conversion of the superoxide anion to hydrogen peroxide in the mitochondria. The enzyme, which is coded by genomic DNA, requires a mitochondrial targeting sequence to gain entry. A well-studied single nucleotide polymorphism (SNP) in the mitochondrial targeting sequence causes a replacement of alanine by valine, resulting in less efficient transport into the mitochondria.
OBJECTIVE: We hypothesize that the MnSOD rs4880 SNP is associated with susceptibility to BPD.
DESIGN/METHODS: Infants (N=80) were enrolled who weighed <1 kg at birth and had no congenital or chromosomal abnormalities. DNA was isolated from buccal mucosal swabs and allelic discrimination was performed using a specific probe with Real-time PCR. BPD is defined by the need for oxygen at 36 weeks PMA. Chi square analyses and ANOVA were performed with $P<0.05$ denoting statistical significance.
RESULTS: There were significant differences in birth weights and gestational ages, but not in racial distributions between BPD and Non-BPD infants. The genotype distributions were not statistically different between BPD and Non-BPD infants (P=0.23). We found significant differences between the genotype distributions of this SNP when we analyzed Caucasian (N=19, p=0.013), but not Hispanic or African-American infants. Significantly more intraventricular hemorrhage was found among infants with BPD compared to Non-BPD.
CONCLUSIONS: Caucasian ELBW preterm infants who progress to BPD are more likely to contain the minor allele for the MnSOD rs4880 SNP, which results in less efficient transport of superoxide anion into the mitochondria. This association was not seen in Hispanics or African-Americans, and cannot be explained by differences in birth weight or gestational age.

54 Fellow in Training

9:30 AM

Single Nucleotide Polymorphisms of Extracellular Superoxide Dismutase (EC-SOD) in the Pathogenesis of Bronchopulmonary Dysplasia

Johanna M. Calo, Hima Maramreddy, Joie Fisher, Divya Chhabra, Kiran Dwarakanath, Sonya Strassberg, Mitashi Singh, Kristen Aland, Lance A. Parton.
Division of Newborn Medicine, Maria Fareri Children's Hospital at Westchester Medical Center, Valhalla, NY; New York Medical College, Valhalla, NY; Carolinas Medical Center Northeast, Concord, NC; Neonatology, Newark Beth Israel Medical Center, Newark, NJ.

BACKGROUND: CuZnSOD (extracellular SOD, ECSOD) is a cytoplasmic enzyme found in lung epithelium responsible for scavenging superoxide radicals that are produced as by-products of oxidative metabolism, and implicated in BPD.
OBJECTIVE: We tested the hypothesis that SNPs of CuZnSOD are associated with the development of BPD in ELBW infants.
DESIGN/METHODS: DNA was isolated from buccal mucosal swabs (N=107). Allelic discrimination was performed using specific probes for CuZnSOD (+809, +5982, +5321, +574 and -631) with Real-time PCR. Chi square analyses and t-test for independent samples were performed with $P<0.05$ denoting statistical significance.
RESULTS: As expected, BPD patients were smaller and less mature than No BPD.

Genotype Frequency

SNP +809	cc	ct	tt	P = 0.06
No BPD	17	21	18	
BPD	16	5	9	
SNP +5982	cc	ct	tt	P = 0.1
No BPD	17	25	20	
BPD	5	23	11	

SNP -631	cc	cg	gg	P < 0.001
No BPD	13	37	9	
BPD	20	9	0	
SNP +5321	aa	ag	gg	P = 0.7
No BPD	7	17	16	
BPD	5	7	8	
SNP +574	gg	gt	tt	P = 0.05
No BPD	2	1	2	
BPD	12	0	1	

CuZnSOD SNP -631 was strongly associated with protection against BPD (P<0.001), with more patients in the No BPD group having the G allele. This SNP has been shown in previous studies to be protective against COPD. SNP +574 was also associated with BPD (P=0.05), with more patients in the BPD group having the G allele (P=0.04).

Genotype Frequency

SNP +809	cc	ct	tt	P = 0.06
No BPD	17	21	18	
BPD	16	5	9	
SNP +5982	cc	ct	tt	P = 0.1
No BPD	17	25	20	
BPD	5	23	11	
SNP -631	cc	cg	gg	P < 0.001
No BPD	13	37	9	
BPD	20	9	0	
SNP +5321	aa	ag	gg	P = 0.7
No BPD	7	17	16	
BPD	5	7	8	
SNP +574	gg	gt	tt	P = 0.05
No BPD	2	1	2	
BPD	12	0	1	

CONCLUSIONS: CuZnSOD SNPs were associated with BPD: we speculate that CuZn SOD-631 confers protection against BPD, with more patients in the No BPD group having the G allele; whereas SNP +574 is associated with BPD, with more patients in the BPD group having the G allele.

55 Fellow in Training

9:45 AM Incidence of and Risk Factors for Bronchopulmonary Dysplasia in Non-Ventilated Preterm Infants

Renee M. Behme, Sharon Kirkby, Wendy Turenne, Linda Genen, Jay Greenspan, Kevin Dysart.

Pediatrics, Thomas Jefferson University, Philadelphia, PA; Alfred I. duPont Hospital for Children/Nemours Foundation, Wilmington, DE; Alere, Atlanta, GA.

BACKGROUND: Bronchopulmonary dysplasia (BPD) is a form of chronic lung disease primarily seen in preterm infants, characterized by an arrest in lung development and early lung injury due to mechanical ventilation and prolonged oxygen supplementation. Accepted interventions to minimize the development of BPD include antenatal steroid therapy, "gentle" ventilation with permissive hypercapnea, and early postnatal surfactant therapy.

OBJECTIVE: Since non-ventilated preterm infants can also develop BPD, we sought to determine which other factors may be related to the development of BPD in non-ventilated preterm infants.

DESIGN/METHODS: Data were collected from the Alere neonatal database for patients born at ≤32 weeks gestational age (GA) and birth weight (BW) less than 1500 grams from 6/2006 to 9/2009 who were never ventilated. BPD was defined as any oxygen or higher respiratory support required at 36 weeks postmenstrual age. BPD and non-BPD groups were compared using multivariate logistic regression models controlling for confounding variables.

RESULTS: 1846 patients met inclusion criteria. Of this group, 9.3% (n=172) developed BPD. GA, BW, and male gender were statistically different between the two groups. After controlling for these variables, non-ventilated infants with acquired sepsis or those who were treated for patent ductus arteriosus (PDA) were twice (1.9 times) as likely to develop BPD. Each day that an infant was delayed in starting feedings increased the likelihood of BPD by 2.8%. Incidence of surfactant administration, maternal steroids, maternal chorioamnionitis, and pre-eclampsia did not differ between the BPD and non-BPD groups.

CONCLUSIONS: Our data show that 9.3% of non-ventilated preterm infants in our population still have an oxygen requirement at 36 weeks postmenstrual age. Clinical variables such as acquired sepsis and PDA treatment contribute to the development of BPD in non-ventilated preterm infants. The identification of modifiable clinical variables that contribute to the development of BPD may add to our understanding of the pathophysiology of BPD and may alter current care practices in the neonatal intensive care unit.

56 Fellow in Training

10:00 AM

Do Plasminogen Activator Inhibitor-1 Single Nucleotide Polymorphisms Increase the Susceptibility of ELBW Infants to Bronchopulmonary Dysplasia?

Divya Chhabra, Johanna Calo, Kristen Aland, Kiran Dwarkanath, Amanda Walsh, Lance A. Parton.

Division of Newborn Medicine, Maria Fareri Children's Hospital at Westchester Medical Center, Valhalla, NY; Pediatrics, New York Medical College, Valhalla, NY; Georgetown University, Washington, DC.

BACKGROUND: Diminished fibrinolytic activity of lung tissue contributes to intra-alveolar deposition of fibrin, fibrinogen and fibrin degradation products, which results in remodeling of the terminal airways. PAI-1 deficient mice have attenuated lung injury while PAI- 1 overexpression has been implicated in hyperoxic and bleomycin-induced lung injury. PAI-1 SNPs, which may change expression of PAI-1, have been linked to multiple disease processes including pulmonary hypertension. PAI-1 polymorphisms (rs2227631 and rs2227672) have been associated with changes in expression of PAI-1. However the role of PAI-1 SNPs in BPD is unstudied.

OBJECTIVE: We hypothesize that PAI-1 SNPs which alter expression of PAI-1 are associated with ELBW infants who progress to BPD.

DESIGN/METHODS: This is an ongoing cohort study of infants weighing < 1kg at birth, without congenital or chromosomal anomalies. BPD was defined as oxygen dependence at 36 weeks post-menstrual age. DNA was isolated from buccal mucosal swabs followed by allelic discrimination utilizing specific probes for PAI-1-rs2227631 and rs2227672 by Real-time PCR. Chi square analyses and ANOVA were performed, with P<0.05 denoting statistical significance.

RESULTS: Patient demographic data revealed significant differences in birth weight and gestational age for those with BPD, as expected.

	Non-BPD	BPD	P Value
Weight (g)	819±112	688±134	<0.0001
Gestational Age (wks)	25.9±1.34	25.34±	0.09
IVH	5	9	0.6
SEPSIS	5	11	0.3
NEC	6	8	0.8

There were no statistically significant associations between either of these two SNP genotypes and BPD. It was however noticed that 4 out of 5 babies with the AG, GT (rs2227631, rs2227672; respectively) haplotypes did not develop BPD.

PAI-1 Haplotypes

	No BPD	BPD
AG+GG	12	9
GG+GG	8	13
AA+GG	4	4
AG+GT	4	1
GG+GT	2	2

P=0.5

CONCLUSIONS: In the early phase of this investigation into potential genetic foundations of BPD contributed by the fibrinolytic pathway, we did not detect an association between either of the 2 PAI-1 SNPs tested and BPD.

57 Medical Student

10:15 AM

Vascular Endothelial Growth Factor Gene Polymorphism Is Associated with Susceptibility to Bronchopulmonary Dysplasia in ELBW Infants

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BACKGROUND: The VEGF pathway has been associated with proliferation, differentiation and apoptosis of many cell types including lung epithelial cells. VEGF is a known growth factor involved in pulmonary vascular morphogenesis and alveologenesis. Variation in VEGF levels have been associated with several pulmonary diseases such as respiratory distress syndrome and bronchopulmonary dysplasia, BPD. Specifically, the 936 C/T SNP, located in the 3' untranslated region, has been associated with variable plasma levels, with the minor allele causing increased VEGF expression.

OBJECTIVE: We tested the hypothesis that SNPs of VEGF contribute to the susceptibility to BPD in ELBW infants.

DESIGN/METHODS: This is an ongoing cohort study from 2002 to present, for infants weighing <1 kg at birth, without congenital or chromosomal anomalies. BPD is defined as the need for oxygen at 36 weeks postmenstrual age (PMA). DNA was isolated from buccal mucosal swabs via DNA adsorption to a silica gel based membrane. Allelic discrimination was then performed using specific probes for VEGF (936, -410, 2594, 405, 1154) with Real-time PCR. Chi square analyses and ANOVA were performed with P<0.05 denoting statistical significance.

RESULTS: Lower gestational age and birthweight were associated with BPD severity, as expected. No differences in racial distribution were seen between the BPD and Non-BPD groups. VEGF SNP 936 approached significance (P=0.07) when this genotype was compared between infants with BPD and those without BPD.

VEGF 936 SNP

	CC	CT	TT
BPD	13	5	2
Non-BPD	31	5	0

P=0.07

The clinical outcomes of NEC, ROP, and severe IVH were not associated with any of the VEGF SNPs tested. PDA requiring medical or surgical treatment approached significance for VEGF-410 SNP (P=0.07).

VEGF -410 SNP and PDA

	CC	CT	TT
PDA	10	12	7
No PDA	2	0	4

P=0.07

CONCLUSIONS: VEGF 936 polymorphism is associated with BPD severity. We speculate that this SNP, located in the 3'UTR may increase expression of VEGF, and contribute to the vascular remodeling associated with BPD.

Saturday, March 27, 2010
8:15 AM-10:30 AM

58
8:15 AM

IUGR Inhibits Pulmonary VEGF Expression in Rat Pups

Omotola O. Uwaifo, Norma B. Ojeda, Barbara T. Alexander.
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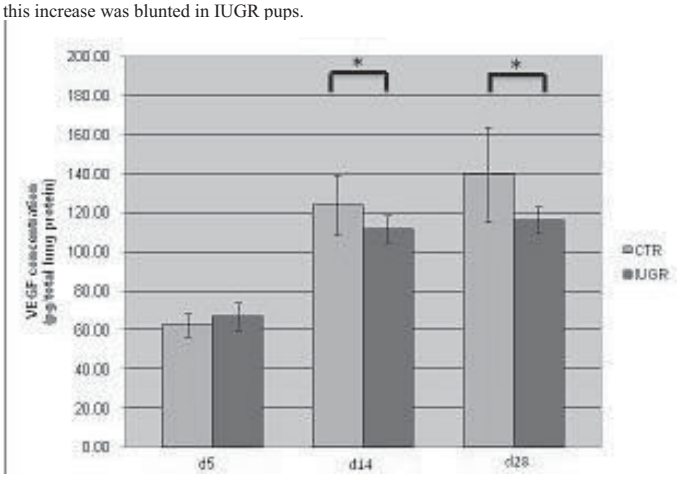
BACKGROUND: An insult to a fetus at a critical period of development may result in permanent adaptive changes which lead to long term changes in organ structure and function (Barker 1994). Studies suggest that intrauterine growth restriction (IUGR), a crude marker for poor fetal development, can lead to impaired pulmonary development and function, yet the mechanism(s) has not been fully elucidated. Utilizing a rodent model of reduced uterine perfusion pressure (RUPP) that leads to IUGR by a reduction of nutrient and oxygen supply in utero, we are investigating mechanisms by which angiogenic factors may negatively affect pulmonary vascular development and consequently pulmonary structure and function.

OBJECTIVE: The objective was to investigate the role of IUGR on pulmonary VEGF expression.

DESIGN/METHODS: IUGR was induced at E14 in timed pregnant Sprague Dawley rats via the RUPP procedure. Briefly, silver clips was placed around the abdominal aorta above the iliac bifurcation and on both the right and the left ovarian arteries. Pups were spontaneously delivered and kept with dams for the duration of the experiment. Pups were weighed daily and sacrificed on days P5, P14 and P28. Lungs were harvested, weighed and flash frozen in liquid nitrogen. Lung homogenates were prepared and VEGF protein was measured using the mouse VEGF Quantikine assay (R&D Systems).

RESULTS: a) While there were significant differences in lung weight and body weight, there were no significant differences in the lung/body weight ratio between Control and IUGR pups, at each time period. b) There was a significant reduction in the VEGF protein expression in IUGR pups at days P14 and P28, but not at day P5. While VEGF expression increased with age in Control pups, this increase was blunted in IUGR pups.



CONCLUSIONS: This data suggests that IUGR induced by RUPP inhibits the expression of VEGF in the lung. This inhibition may negatively affect pulmonary vascular development and contribute to alterations in pulmonary development and function in IUGR offspring.

59
8:30 AM

Hormonal Maintenance of Surfactant Production in Cultured Type II Cells of Adult Human Lung

Philip L. Ballard, Jae W. Lee, Xiaohue Fang, Cheryl C. Chapin, Linda W. Gonzales, Venkatadri Kolla, Michael A. Matthay.
Pediatrics, University of California San Francisco, San Francisco, CA; Anesthesiology, University of California San Francisco, San Francisco, CA; Cardiovascular Research Institute, University of California San Francisco, San Francisco, CA; Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Alveolar type II cells have multiple functions including surfactant production and fluid clearance that are critical for normal lung function. Precocious differentiation of type II cells occurs in cultured fetal lung epithelial cells treated with dexamethasone plus cAMP/isobutylmethylxanthine (DCI).

OBJECTIVE: We hypothesized that DCI treatment would maintain phenotypic properties of adult type II cells in culture.

DESIGN/METHODS: Type II cells were isolated at 95% purity from 5 adult lungs and cultured 5d on collagen-coated plates in serum-free medium±DCI. Gene expression was assessed by DNA microarray (Affymetrix U133A), qPCR, immunostaining and Western analysis.

RESULTS: Freshly isolated cells were >95% viable and expressed high levels of surfactant proteins (SP)-A/B/C. During control culture, expression levels decreased >2-fold for 6.9% of expressed genes including 21 genes related to surfactant and numerous genes of immune response. Large decreases in mRNA content occurred for PGC (SP-B processing, 25-fold) and SP-C (14-fold), and d-5 control cells contained fewer lamellar bodies. DCI treatment during culture increased 316 mRNAs ≥1.5-fold (range 1.6- to 59-fold) compared to control cells, representing ~4% of expressed genes; 40% of these genes were also hormone-induced in previous studies with fetal cells (Wade et al. Am J Resp Cell Mol Biol 2006). Highest induction (>10-fold) occurred for PGC, ZBTB16, DUOX1, PLUNC and CIT. 15 genes related to surfactant were induced (PGC, PLA2G10/1B, SFTPC, FASN, FABP5, LPL, FADS1, CEBPD, SFTPB, SFTPD, ADRP, SCD, SFTPA, and LDLR). Induction of selected genes was confirmed by qPCR and/or Western analysis. DCI-treated cells contained lamellar bodies that were positive for SP-B and DC-LAMP. 25 genes that were induced in both fetal and adult cells, including 6 genes related to surfactant, also had decreased expression during control culture and thus are candidates for hormonal regulation in vivo.

CONCLUSIONS: Exposure of adult type II cells to glucocorticoid and cAMP during culture maintains expression of surfactant-related and other genes. Surfactant production and other type II cell functions may be modulated by hormones in vivo in response to stress, injury or disease.

60 Ph.D. Student
8:45 AM

CC10 mRNA Expression during Early Development: Impact of Surfactant and rhCC10 Treatments

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Physiol, Temple Univ Sch Med, Phila, PA; CVRC, Temple Univ Sch Med, Phila, PA; Nemours Lung Res Ct, AI duPont Hosp Child, Wilm, DE; Peds, Temple Univ Sch Med, Phila, PA; Med & Temple Lung Ct, Temple Univ Sch Med, Phila, PA.

BACKGROUND: CC10 is a pleiotrophic anti-inflammatory protein secreted by airway clara cells and is deficient in the immature lung. Acute and iatrogenic inflammation has been hypothesized to precipitate progression to bronchopulmonary dysplasia from respiratory distress syndrome (RDS). We have previously shown that surfactant treatment (SFT), followed by recombinant human clara cell secretory protein 10 (rhCC10) administration, reduces inflammation (J Appl Physiol 2005;99:2204-11) and increases surfactant and VEGF expression (Am J Perinatol 2008;25:637-45) compared to SFT alone. The effect of SFT and/or rhCC10 on endogenous CC10 expression (CC10exp) in early development is unknown.

OBJECTIVE: To evaluate the effect of SFT and/or rhCC10 on CC10exp in the preterm lamb with RDS.

DESIGN/METHODS: 24 premature lambs (126±3 days) were instrumented, delivered, paralyzed, and ventilated. Following baseline, animals were randomized to group(n=6/group): untreated, SFT (Survanta® 100mg/kg; 4ml/kg), or SFT followed by intratracheal rhCC10 (1.5 or 5 mg/kg; 2 ml/kg). After 4 hrs, the animals were anesthetized, dissected, and lung tissue was snap frozen. Ovine CC10 cDNA was cloned and sequenced (Genebank #FJ959385). RNA was extracted from lung tissue, and qPCR with the specific primers was used to measure CC10exp normalized to ß-actin expression. IL-6 protein was measured by ovine-specific sandwich ELISA.

RESULTS: There was no significant difference in lung CC10exp or IL-6 protein between the untreated and SFT alone groups or between the two doses of rhCC10 respectively. CC10exp and IL-6 in the rhCC10 treated animals were less ($p < 0.05$) than in untreated and SFT alone groups.

Mean ± SE ; *$p < 0.05$

	No Treatment	SFT Alone	SFT + rhCC10
Relative CC10exp (x 10^{-3})	6.62 ± 1.34	5.64 ± 3.04	0.60 ± 0.25*
IL – 6 (ng/gm tissue)	134.6 ± 39	132.7 ± 30	16.6 ± 1.90*

CONCLUSIONS: These data demonstrate that rhCC10, and not SFT, alters CC10exp and IL-6 in the ventilated lung during early development. Given this SFT independent effect, we speculate that rhCC10 causes negative feedback by reducing inflammation. Further study is needed to quantify the action of other animal derived and synthetic SFT, corresponding inflammatory profiles, and rhCC10 dosing strategies on CC10exp as a protective strategy against inflammatory-induced lung disease. Support: NIH 5T32HL091804; P20RR020173; Clarassance, Inc. (Claragen, Inc.); Ross Labs.

61 Fellow in Training
9:00 AM

MicroRNA miR-205 Is Downregulated during Type II Alveolar Epithelial Cell Differentiation

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BACKGROUND: Arrested lung development with incomplete pulmonary cell differentiation contributes significantly to the development of Bronchopulonary Dysplasia (BPD). Therefore, understanding the molecular mechanisms of alveolar type II cell differentiation will provide insights into the mechanism of BPD pathogenesis and potentially identify novel therapeutic strategies. MicroRNAs (miRNAs) are a class of small, non-coding RNAs that are thought to play a crucial role in development and human disease. Previous studies using miRNA micro-arrays demonstrated that miR-205 undergoes a 10-fold decrease in expression following type II cell differentiation.

OBJECTIVE: To characterize the expression of miR-205 both *in vivo* and *in vitro* during alveolar epithelial differentiation, and to identify potential mechanisms of action of miR-205 in regulating differentiation

DESIGN/METHODS: MiR-205 expression was examined in *in vitro* human fetal lung epithelial cell culture, mouse fetal and neonatal lung development, and the baboon model of BPD. Lung epithelial cells purified from second trimester human fetal lung tissue were cultured in serum-free medium alone (control) or with a hormone mixture (DCI-dexamethasone, cAMP, isobutylmethylxanthine) for up to 5 days. Mouse lung tissue was harvested at several time points from E12.5 to P14. Lastly, lung samples from the Baboon BPD Tissue Bank, including preterm animals at d125, d125 animals exposed to 14d ventilation/sufactant/oxygen (BPD model), and d140 gestational age controls, were analyzed for changes miR-205 expression. Total RNA was extracted, and reverse transcription and real-time PCR were performed using Taqman assays with species-specific primers for mir-205.

RESULTS: In mouse lung, miR-205 expression declined 10-fold from E12.5 to P14. Similarly, in HFLC, mir-205 expression was highest in control treated cells, with a 5-fold decline evident by d3 of DCI treatment. Interestingly, in the BPD samples, while mir-205 expression showed a significant decline between d125 and d140, in the BPD samples miR-205 failed to decline and remained at the same level as in the d125 samples.
CONCLUSIONS: MiR-205 is significantly downregulated during lung alveolar epithelial development, particularly type II cell development. Failure of downregulation may be associated with the development of BPD. Experiments are ongoing to determine potential regulatory targets of miR-205.

62 Medical Student

9:15 AM

Knock-Down of Presenilin-1 (PSEN-1) Blocks ErbB4-Regulated Surfactant Synthesis in MLE-12 Cells

Anika Ritzkat, Ekaterini Pringa, Melissa Dere, Cristina Scapin, Oya Guengoeze, MaryAnn V. Volpe, Christiane E.L. Dammann, Heber C. Nielsen.
Tufts Medical Center, Boston, MA; Hanover Medical School, Hanover, Niedersachsen, Germany; Tufts School of Medicine, Boston, MA.

BACKGROUND: ErbB4 receptor signaling is critical for type II cell maturation and surfactant synthesis. We reported that ErbB4 knock down inhibits surfactant protein production. The specific signaling pathway through which this is mediated is not known. A novel ErbB4 signaling mechanism involves membrane cleavage of ErbB4 by the γ secretase enzyme complex, followed by nuclear transport of the intracellular cleavage product. We have also shown that expression of PSEN-1, the active enzyme component of the γ secretase complex, is strongly increased in late gestational age fetal mouse alveolar type II cells.
OBJECTIVE: We hypothesized that ErbB4 control of surfactant synthesis requires the activity of PSEN-1.
DESIGN/METHODS: We used pre-designed siRNAs (Applied Biosystems) targeting three separate regions of the PSEN-1 mRNA to knock down PSEN-1. We studied the effect of knock down on SP-B and SP-C mRNA levels using MLE-12 cells. First, to optimize conditions, cells were transfected with cocktails containing different levels of equimolar amounts of the three PSEN-1 siRNA sequences using Dharmafect 2 (Dharmacon) as the transfection reagent. Then RT-PCR was used to measure SP-B and SP-C mRNA with beta-actin as an internal standard. Results were expressed as the % change after PSEN-1 knockdown of scrambled siRNA-treated controls.
RESULTS: Optimum knock down (88% after 48 hrs) was achieved by a cocktail containing 5 nmoles of each sequence. Data for surfactant protein mRNA are the averages of two experiments, each done in triplicate. PSEN-1 knock down reduced mRNA for both SP-B (67% of scrambled control) and SP-C (61% of scrambled control). Treatment with scrambled siRNA or Dharmafect alone did not significantly affect SP-B or SB-C mRNA compared to untreated controls.
CONCLUSIONS: These data support the hypothesis that PSEN-1 activity is a crucial component of ErbB4 signaling for regulation of SP-B and SP-C gene expression in MLE-12 type II cells. Interpreted in the context of our previous studies, these data support a model of ErbB4 signal transduction involving nuclear localization of the intracellular ErbB4 fragment for regulation of surfactant protein synthesis.**Funding:** NIH HL085648, HL037930, Gerber Foundation, Peabody Foundation, Tufts Institutional Grant

63 Ph.D. Student

9:30 AM

MiR-221 and miR-130 in Developing Lung: Role in Hox Gene Regulation

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BACKGROUND: MicroRNAs regulate expression of Hox transcription factors including ones necessary for lung development. Hoxa5 and Hoxb5 have distinct functions in lung airway and alveolar formation. Hoxa5 is regulated by miR-130a and Hoxb5 by miR-221 in other cell types. Specific regulation of Hoxa5 and Hoxb5 in developing lung by these miRNAs is unknown.
OBJECTIVE: We hypothesize that miR-130a and miR-221 help control lung development through regulation of Hoxa5 and Hoxb5.
DESIGN/METHODS: Expression of miR-130a and miR-221 was determined in E15-18 fetal mouse lungs by qRT-PCR (normalized to E15). In situ hybridization was used in E16-E18 fetal mouse lung tissue sections to identify cell-specific miR-130a and miR-221 expression. To study effects of miR-130a and miR-221 down-regulation or up-regulation on lung development, E14 whole fetal mouse lungs were cultured *ex vivo* (48hr) with control (scrambled) or anti-miR or mimics to 130a and 221.
RESULTS: miR-130a and miR-221 RNA levels remained unchanged from E15-E17. At E18, miR-130a decreased slightly but miR-221 increased significantly (≥10 fold). Spatial and cellular localization differentially changed with advancing gestation. MiR-130a expression was more intense in epithelium than mesenchyme at E16. Mesenchymal expression increased at E17 but epithelial expression decreased in distal airways. By E18, miR-130a was restricted to mesenchyme and columnar epithelium of more central airways. Conversely, at E16, miR-221 was strongly expressed in both bronchiolar epithelium and mesenchyme. At E17, epithelial expression decreased whereas mesenchymal expression remained strong around central airways. At E18, mesenchymal expression became even more intense and epithelial expression remained minimal. Compared to controls, anti-miR-130a treatment led to smaller lungs with reduced airway branching whereas mimic 130a treatment led to much larger lungs,with numerous finely arborized branches that extended into central lung regions. Conversely, anti-miR-221 treated lungs had more distal branch generations whereas mimic 221 treated lungs had less airway branching and more dilated airway tips.
CONCLUSIONS: MiR-130a and miR-221 temporal, spatial and cell-specific expression as well as induced alterations in lung branching caused by these miRNAs parallel our published work on Hoxa5 and Hoxb5 in developing lung and support lung-specific regulation of Hoxa5 and Hoxb5 expression by miR-130a and miR-221, respectively. Support: HL37930, HD044784, TMC Grant, Peabody Foundation.

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9:45 AM

MUC1 in the Developing Lung: Response to Inflammation

J. Wu, T.L. Hubert, Y. Park, K. Kato, K.C. Kim, T.H. Shaffer, M.R. Wolfson.
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BACKGROUND: Mucins are a family of high-molecular-weight glycoproteins present in mucus. MUC1/Muc1 (MUC in human; Muc in nonhuman) is a membrane-tethered mucin expressed on the surface of mucosal epithelial cells. Recent studies demonstrate that airway MUC1/Muc1 has an anti-inflammatory effect and is likely important to the pro- and anti-inflammatory balance that determines lung protection. During early development, the lung is deficient in anti-inflammatory defenses such as surfactant proteins and CC10, a Clara cell-secreted pleiotrophic protein. It is unknown if lung MUC1 is 1) developmentally regulated or 2) responsive to exogenous surfactant therapy (SFT) and/or rhCC10 anti-inflammatory therapy.
OBJECTIVE: To assess: 1) age-related differences in lung Muc1 protein; 2) lung Muc1 protein responses to SFT and/or rhCC10 intervention in the preterm lamb with respiratory distress syndrome.
DESIGN/METHODS: Preterm lambs (n = 18; 126 ± 3 SE days) were instrumented, delivered, paralyzed, and ventilated. Following baseline measurements, the lambs were randomized to group (n=6/group): untreated, SFT (Survanta®;100mg/kg), or SFT followed by intratracheal rhCC10 (1.5 mg/kg). After 4 hrs, the lambs were anesthetized, dissected, and lung tissue was snap frozen. Ewes (n=6) were anesthetized, dissected, and lung tissue was snap frozen. All lung tissue was prepared for analyses of Muc1 protein by ELISA with CT33 antibody to recognize the cytoplasmic tail and for IL-8 protein in the lamb using ovine-specific sandwich ELISA.
RESULTS: Lung Muc1 was lower ($p < 0.0001$) in the lambs as compared to adult sheep (ewe). Lung Muc1 and IL-8 were lower ($p < 0.05$) in lambs treated with SFT followed by rhCC10 compared to those receiving no treatment or SFT alone. There was no significant difference in lung IL-8 or Muc1 between lambs receiving no treatment compared to SFT alone.
CONCLUSIONS: These data demonstrate that lung Muc1 protein is developmentally regulated, increasing with age. In addition, while relatively low in the preterm, lung Muc1 is responsive to the pre-existing inflammatory background and can be modulated by specific interventional therapies that reduce inflammation. As such, further study is warranted to investigate lung MUC1 regulation in early development, it's use as a novel biomarker of lung injury, and/or as a lung protective therapeutic approach. Supp.: NIH 5T32HL091804; P20RR020173; RO1 HL-47125;Clarassance, Inc. (Claragen, Inc.); Ross Labs.

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10:00 AM

Pulmonary Vascular Resistance (PVR) Response to Oxygen Is Altered by Inhaled Nitric Oxide (iNO) in Lambs with PPHN

Satyan Lakshminrusimha, Bobby Mathew, James A. Russell, Karen A. Wynn, Rita M. Ryan, Jayasree Nair, Daniel D. Swartz.
Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Ventilation with high concentrations of oxygen is the mainstay of therapy in persistent pulmonary hypertension of the newborn (PPHN). Some infants with PPHN are managed with supraphysiological PaO_2 levels to prevent episodes of hypoxic pulmonary vasoconstriction. The optimal FiO_2 during management of PPHN is not clear. We reported that in lambs with PPHN, increasing FiO_2 above 0.5 does not result in additional decrease in PVR. However, decreasing FiO_2 to 0.21 or 0.1 results in marked elevation in PVR (Pediatr Res.2009Nov;66(5):539-44). The effect of iNO on the relationship between PVR and FiO_2 in the newborn is not known.
OBJECTIVE: To study the relationship between PVR and FiO_2 in control and PPHN lambs receiving iNO.
DESIGN/METHODS: PPHN was induced by antenatal ligation of the ductus arteriosus in fetal sheep 8d prior to delivery. Lambs were delivered by C-section and instrumented to measure pulmonary arterial (PA) and left atrial pressures and pulmonary blood flow. At 2h of age, 5 PPHN lambs and 3 controls were randomly and sequentially ventilated with varying concentrations of oxygen (FiO_2 0.1, 0.21, 0.5 and 1.0) for 10-20 min each while receiving 20 ppm iNO. Blood gases were analyzed from aorta and PA at each FiO_2 level.
RESULTS: There was no significant increase in PVR in PPHN and control lambs on iNO despite hypoxic ventilation with 10%O_2. While receiving iNO, PVR did not change during ventilation with different oxygen levels despite significant changes in PO_2 levels in the aorta and PA.

Changes in aortic and pulmonary arterial pO2 and PVR in newborn control and PPHN lambs receiving inhaled NO

	Control lambs(n=3)			PPHN lambs(n=5)		
FiO2	Aortic pO2	Pulm Art pO2	PVR	Aortic pO2	Pulm Art pO2	PVR
0.1	17±2*†	13± 2*†	0.3±.05	17±1†	13±2*†	0.37±.02
0.21	57±5†	33±1	0.29± .04	50±3	30±1.5	0.33±.01
0.5	175±17*	45± 4	0.3± .05	75±10*	39±3	0.33±.01
1.0	391±36*†	70±5*†	0.3± .05	185±22*	41±3	0.33±.01

* p<0.05 cf. FiO2 0.21 and † p<0.05 cf. FiO2 0.5

CONCLUSIONS: Ventilation with iNO in newborn control and PPHN lambs prevents acute increases in PVR following brief periods of alveolar hypoxia and maintains low and stable PVR. Hyperoxic ventilation to achieve supraphysiological PaO_2 levels may not be necessary in infants with PPHN receiving iNO therapy.

66 Fellow in Training

10:15 AM

Intrauterine Growth Restriction Decreases Airway Responsiveness to Methacholine in Female Rats

Catalina Bazacliu, Melissa Carmen, Bobby Mathew, Rita M. Ryan, Satyan Lakshminrusimha, Daniel D. Swartz.

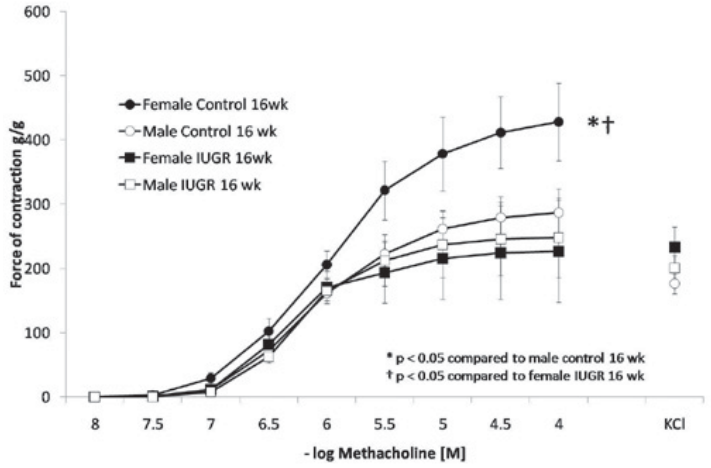
Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Intrauterine growth restriction (IUGR) affects 10% of all newborns. IUGR infants are found to be at higher risk for abnormalities of airway function [Dezateuxl, Thorax 2004, Edwards, Thorax 2003]. Elegant studies have shown increased airway responsiveness to methacholine among postpubertal girls [Tantisira, AJRCCM 2008].

OBJECTIVE: Our objective was to evaluate gender and developmental differences in constriction response to methacholine in tracheal rings from IUGR and control rats.

DESIGN/METHODS: Pregnant rats were fed a low protein diet (LPD) (8% protein) during pregnancy to induce IUGR. Control rats were fed standard diet (19% protein) throughout the study but after birth the LPD mothers and pups were placed on a high fat diet (32% fat) until 16wk of age. At 3 and 16wk, tracheal rings were removed and placed in an isolated tissue bath with Krebs Ringer solution bubbled with 5% CO2 and air. Constriction response to increasing concentrations of methacholine (10^{-8} to 10^{-4}M) was recorded.

RESULTS: Eighteen IUGR rats and 14 controls were evaluated for tracheal ring studies. At 3wk, IUGR offspring weighed significantly less than controls (23±4g vs 48±6g) with no significant gender differences. At 16wk, IUGR rats weighed similar to controls but male rats weighed significantly more than females (427±23 vs. 267±14g). All tracheal rings constricted to methacholine in a concentration-dependent manner. At 3wk there was a tendency toward higher constriction in female controls. As reported in humans, female control rat tracheal rings constricted significantly greater compared with male controls at 16wk. In contrast, tracheal rings from IUGR rats did not show any gender differences. Compared with controls, IUGR rat females had a significantly lower contraction response to methacholine.



CONCLUSIONS: Maternal LPD resulted in IUGR at birth with catch up growth by 16wk on high fat diet. Maternal LPD significantly affects tracheal reactivity in a gender specific manner.

General Pediatrics I Platform Session

Saturday, March 27, 2010
8:15 AM-10:30 AM

67

8:15 AM

Wishful Thinking: Safe Transportation of Newborns at Hospital Discharge

S.C. Rogers, K. Gallo, H. Saleheen, G. Lapidus.

Injury Prevention Center, Connecticut Children's Medical Center, Hartford, CT; Pediatric Emergency Medicine, Connecticut Children's Medical Center/University of Connecticut School of Medicine, Hartford, CT.

BACKGROUND: Motor vehicle occupant injury is a significant source of morbidity and mortality among children. Correctly installed and used car safety seats (CSS) substantially reduce morbidity and mortality. The AAP recommends infants travel in a properly installed CSS starting with their first ride home from the hospital.

OBJECTIVE: To understand how parents learn to install CSS and describe use at newborn discharge.

DESIGN/METHODS: We prospectively enrolled maternal/infant dyads at discharge from a large urban teaching hospital. Survey data included maternal demographics and parental knowledge on CSS installation. After survey completion, a certified car seat technician observed and recorded CSS information, infant placement and placement in vehicle.

RESULTS: 101 mothers were enrolled with mean age 29.4 years (15-45 years); 51% white, 18% black, 27% Hispanic; 50% college degree or higher; 52% privately insured. CSS information: 18% had previous owners, 2% involved in a crash, 3% on recall lists, and 2% expired. Mothers reported CSS installation learned by reading the manual (38%), friend/relative (25%), nurse/doctor (9%), car seat clinic (9%), never taught (8%), video (4%), or other (8%); and learned about installation before the baby was born (34%), from previous child (33%), before leaving hospital (16%), during prenatal care (7%), or at car seat clinic (5%). Location of learning was at their friends relatives or own home (53%), in the hospital (17%), at police/fire dept (13%), at health dept (3%), at doctor office (1%), or other (14%). We observed 254 CSS errors (range 0-7, mean = 2.5). 52% were infant placement errors (range 0-4, mean 1.3) and 48% CSS placement in vehicle errors (range 0-4, mean = 1.2). **See table 1.** Greater misuse was observed among young, non-white, high-school educated mothers (p<.001). These initial findings including **29% CSS not attached to vehicle**, led to early termination of the study and efforts directed at interventions.

CSS Misuses Identified (n=101)

INFANT PLACEMENT IN CSS (132 misuses)	%
Incorrect harness position	20
Incorrect retainer clip position	46
Loose harness straps	60
Missing/Broken CSS parts	5
CSS PLACEMENT IN VEHICLE (122 misuses)	
Not 45 degree angle	27
Not attached to vehicle	29
Loosely attached	51
Tilting to side	14

CONCLUSIONS: Despite national, state, and hospital policies that require newborns to be transported in a CSS, we found a significant amount of concerning CSS misuse in our study population.

68

8:30 AM

Storing Medical History on USB Drives: The CHAM DRIVE Project

Sara M. Marnell, Katherine Freeman, Catherine C. Skae.

Pediatrics, Children's Hospital at Montefiore/Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Past medical history is vital to any patient encounter. Lack of an accurate past medical history can lead to medical error. Providers spend substantial time obtaining this information. While recent focus has been on EMR, a system created for patient possession has not been well-studied.

OBJECTIVE: To evaluate the impact of providing patients discharged from Children's Hospital at Montefiore with a password-protected USB drive containing their past medical history and discharge summary.

DESIGN/METHODS: Setting: Inner-city children's hospital. Descriptive study using questionnaire. Inclusion criteria: hospitalization >7 days, NICU/PCCU admission, chronic medical condition, or enrollment in program serving children with complex needs. A password-protected USB drive (CHAM DRIVE) containing patient medical history and discharge summary was provided on discharge. Subjects were contacted by phone >6 weeks after discharge to complete a questionnaire. Demographics and data regarding device satisfaction and usage were recorded and analyzed.

RESULTS: 125 subjects were enrolled. 77 questionnaires (62%) completed to date. Mean age=7.8 years, 94% minority, 56% English primary language, 73% Medicaid, 85% own computers. At >6 weeks post-discharge, 97% of enrollees still had the CHAM DRIVE (1=stolen, 1=lost). Satisfaction: 100% liked having their own copy of medical information and would recommend the CHAM DRIVE to others. 99% felt it was safe. 89% were more interested in keeping track of medical information since receiving it. Usage: 87% reported carrying it to hospital and clinic visits. 83% of subjects had had a clinic visit, 59% of subjects had been to our ED; 43% had been admitted to our hospital; 4% had been to outside ED; 1% had been admitted to outside institution. 44% of subjects reported CHAM DRIVE use during the clinic visit; 41% reported use in our ED, 56% reported use in our hospital, 100% reported use in outside ED; 100% reported use in outside hospital. The difference in usage rates between clinic (44%) vs. ED (45%) vs. hospitalization (58%) did not reach statistical significance (p=.39).

CONCLUSIONS: These findings provide evidence regarding the impact of a medical record system created for patient possession. Patients/families value having their own copy of medical information and are more interested in keeping track of this after receiving a CHAM DRIVE. They found the system to be safe and would recommend it to others. More investigation is warranted regarding usage practices.

69 House Officer

8:45 AM

Internet Use by Parents for Health Information in an Urban Community

Lorena Muniz, Wipanee Phupakdi, David H. Rubin.

Pediatrics, St. Barnabas Hospital, Bronx, NY; Pediatrics, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Computer and internet usage for health information have become more prevalent. Yet significant barriers exist which limit universal access, including older age, lower level of education and lower socioeconomic status. There is little information regarding the use of computers for health information by parents for the benefit of their children residing in urban communities. Previous studies have been limited to adult populations who seek health related information for themselves.

OBJECTIVE: To investigate the access and use of the internet by an urban pediatric parent population for health information and to ascertain the level of interest in using the internet as a method of communication with their child's health care provider.

DESIGN/METHODS: Self administered surveys (in English and Spanish) were obtained from parents/guardians of pediatric patients in three pediatric clinics in a large urban community hospital in the Bronx, NY over a 3-month period in 2008. Survey questions focused on computer, internet, and email access and use. Statistical analysis included descriptive, univariate and multivariate analysis.

RESULTS: 291 questionnaires were completed; the respondents age ranged from 17- 59 years with a mean±SD age of 30.7±8 years. 76% had an education level of high school or less than high school, 81% were Hispanic, 48% reported being more comfortable reading Spanish. Computer related data showed: 64% had a computer at home, 58% had internet access at home, 55% used email, and 65% used the internet to look up health information for their children routinely if they had a computer at home (52% had used it at least once in the past). The most popular web sites for health information were WebMD (38%) and Univision (21%). 58% expressed a desire to communicate with their physician by email. Significant predictors of internet health information behavior were level of education (adjusted OR 9.1, 95%CI 3,31), computer at home (adjusted OR 3.3, 95%CI: 1.7,6.3) and prior access to the internet (adjusted OR 22.5, 95%CI 5, 109).
CONCLUSIONS: These data suggest that a large percentage of parents in this community had a computer and/or used the internet at home, and that those with a higher education sought to use the internet for health seeking information regarding their children. Future studies should focus on increasing the use of the internet for child health information in this population and measuring the impact of this intervention.

70

9:00 AM

Use of a Patient Portal in Pediatrics

Iman Sharif, David West.

General Pediatrics, Nemours/A.I.duPont Hospital for Children, Wilmington, DE.

BACKGROUND: Many hospitals have implemented "patient portals"– interfaces to the medical record that allow patients to access some of their health information and communicate with their doctors. Concerns have been raised that as poorer patient have less access to the internet, patient portals are not useful for underserved populations. Understanding who uses the patient portal can be critical to improving its access to patients, and helping to decrease the potential for disparities in access.
OBJECTIVE: To compare use of a patient portal in pediatrics by demographic characteristics.
DESIGN/METHODS: We analyzed the primary care database of an academic children's hospital where a patient portal was rolled out between December 2007 and November 2009. This portal allows parents/patients to access the following types of information: diagnosis, medication list, and laboratory results released by the doctor. Parents can also ask for prescription refills, schedule appointments, ask their doctor questions, or make a customer service comment/request. To be enrolled in the portal, the parent must file a reqest that is then approved by the doctor. Descriptive and bivariate statistics were used.
RESULTS: Data was available for 60,195 children from 12 primary care practice of varying panel sizes, ranging from 1,182 to 11,596. Overall 5,928(10%) of children were enrolled into the patient portal between December 2007 and November 2009. Median age of enrolled patients was 4 years, interquartile range 0-7. Enrollment varied significantly between practices ($p<0.0001$), ranging from 2% in the smallest practice, to 30% in a practice of 6,102, and 12% in the largest practice. Medicaid recipients were less likely to be enrolled (9% vs. 11%, $p<0.0001$) Among enrolled patients, 1,760(30%) ever used the patient portal. Use of the portal was higher for infants than for children under 5 years or children 6 years and up (37% vs. 31% vs. 25%, $p<0.0001$). Parents of Medicaid-recipients were less likely than those with private insurance to use the portal (20% vs. 38%, $p<0.0001$).
CONCLUSIONS: Socioeconomic status, as measured by insurance status, is a significant predictor of the families' use of the portal. As technological advances provide new ways for patients to access their health information, the risk of the "digital divide" between disadvantage and advantaged groups may become exacerbated. It is noteworthy that 20% of Medicaid recipients did use the portal; providers serving such patients should not discount the idea of using a patient portal for their populations.

71 Fellow in Training

9:15 AM

Addressing Children's Hospital Crowding by Smoothing Occupancy

Evan Fieldston, Matthew Hall, Samir Shah, Marion Sills, Anthony Slonim, Angela Myers, Courtney Cannon, Susmita Pati.

Univ of PA, Philadelphia, PA; Children's Hosp Phila, Philadelphia, PA; Child Health Corp of America, Kansas City, KS; Univ of CO, Denver, CO; Carilion Clinic, Roanoke, VA; Univ of MO, Kansas City, MO; Children's Hosp Boston, Boston, MA.

BACKGROUND: High levels of hospital occupancy are associated with poorer patient outcomes, decreased access, and increased provider stress. Hospitals respond to crowding in a number of ways, but often focus on reducing length of stay (LOS). For hospitals already functioning at reasonable levels of efficiency, additional efforts to reduce LOS may not sufficiently increase functional capacity. In children's hospitals, median LOS is 2-3 days, so throughput improvement may be limited in reducing crowding. Managing scheduled admissions through "smoothing" has been proposed as an alternative strategy to reduce variability in daily occupancy and thereby reduce weekday crowding.
OBJECTIVE: To quantify the effect of smoothing on crowding at children's hospitals.
DESIGN/METHODS: Daily inpatient census & standardized length-of-stay ratios (SLOSR) were calculated for 39 free-standing, tertiary-care children's hospitals in the Pediatric Health Information System (PHIS) for 2007. Midnight census was used to calculate daily occupancy. A retrospective smoothing algorithm set each hospital-day's occupancy to the hospital's mean occupancy for each week. Post-smoothing reductions in weekly maximum occupancy were averaged for the entire year for each hospital. We determined the number of patients beyond 85%, 90%, 95%, and 100% occupancy levels pre- and post-smoothing, and the change in the number of hospitals, patient days, and patients exposed to these levels of occupancy.
RESULTS: Hospitals' mean occupancy was 70.9%-108.1% on weekdays and 65.7%-94.9% on weekends. Weekday occupancy exceeded weekend occupancy (median difference 8.2%-points (IQR: 7.2-9.5)) (Fig 1). Mean post-smoothing reduction in weekly maximum occupancy across all hospitals was 6.6%-points (IQR: 6.2-7.4) (Fig 2). By smoothing, 39,607 patients from the 39 hospitals were removed from exposure to occupancy levels >95%.

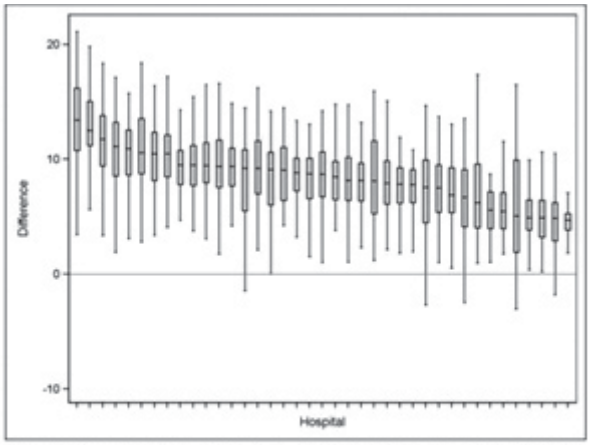


Fig 1. Differences between weekday and weekend percent occupancy by hospital for each week. Each box represents data from 1 hospital. On each boxplot, the box spans the interquartile range for differences between weekday and weekend occupancy while the line through the box denotes the median value. The vertical lines or "whiskers" extend upward or downward up to 1.5 times the interquartile range.

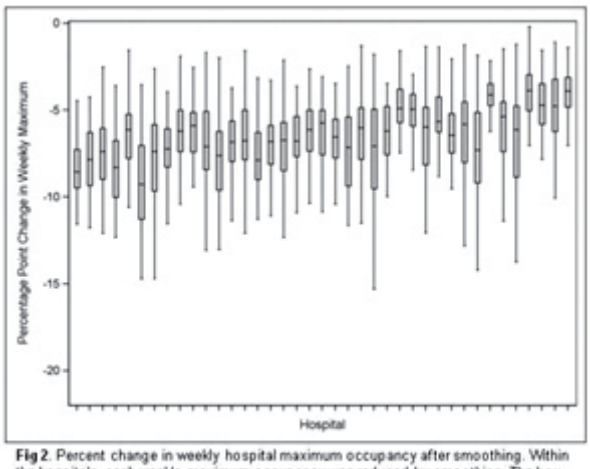


Fig 2. Percent change in weekly hospital maximum occupancy after smoothing. Within the hospitals, each week's maximum occupancy was reduced by smoothing. The box plot displays the distribution of the reductions (in percentage points) across the 52 weeks. The midline of the box represents the median percentage point reduction in maximum occupancy, and the box comprises the 25th to 75th percentiles (i.e. the interquartile range). The whiskers extend to 1.5 times the IQR.

CONCLUSIONS: Smoothing occupancy over a week can provide hospitals with a useful strategy to reduce crowding.

72 Medical Student

9:30 AM

Relationship between Housing Characteristics and Environmental Exposures in Urban Minority Children

Marissa Hauptman, Mary S. Wolff, Maida P. Galvez, Barbara Brenner, Susan Teitelbaum.

Preventative Medicine, Mount Sinai School of Medicine, New York, NY; New York University School of Medicine, New York, NY.

BACKGROUND: Concerns exist about toxins in our daily environment such as second-hand smoke (SHS) and endocrine disrupting chemicals (EDs) due to their widespread use, biological activity and their influence on childhood conditions including asthma. These exposures may be mitigated by neighborhood factors including housing characteristics.
OBJECTIVE: To assess SHS and ED exposure levels in urban minority children based on housing characteristics.
DESIGN/METHODS: In a cohort study of Hispanic and Black, New York City (NYC) children ages 6-8 years, parents/guardians were interviewed in-person. Analyses include 242 girls and 98 boys. Using ArcGIS, geocoded home addresses were matched to housing data in the NYC Dept of City Planning Primary Land Use Tax Lot Output database. Housing characteristics were assessed: ownership (public vs private) and building age (pre vs postwar). Child urine samples were analyzed by the CDC for ED metabolites including phthalates and phenols (2,5 dichlorphenol and bisphenol A); and cotinine (a breakdown product of nicotine) was assessed, as an indicator of SHS exposure. Population characteristics and biomarkers were compared across owner type and year housing built. Models were adjusted for age, race/ethnicity and gender.
RESULTS: The proportion of Black children living in public housing (54%) is significantly greater than the proportion of Hispanic children living in public housing (46%), $p<0.001$. A greater proportion of Black children were living in prewar (53%) housing compared to Hispanic children (47%), $p <0.001$. Age or gender did not differ by housing characteristics. After adjusting for covariates, children living in public housing had statistically significantly higher cotinine levels than children in privately owned housing ($p<0.005$). None of the other biomarkers were significantly associated with ownership or housing age.

CONCLUSIONS: The significant difference in cotinine, in children living in public versus private housing suggests that housing characteristics are one aspect related to SHS exposure that needs to be explored further. As childhood asthma remains the leading cause of hospitalizations in the US, further public health efforts targeting healthy homes and more specifically, public housing, may be warranted.

73 Fellow in Training

9:45 AM

Bed Usage in the Pediatric Intensive Care Unit

Evan Fieldston, Christian Terwiesch, Joshua Metlay, CHOP PICU Research Group.
Univ of PA, Philadelphia, PA; Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Patient flow refers to movement of patients through health care organizations or parts of it. For quality, value, and access reasons, significant attention is focused on optimizing patient flow. Pediatric Intensive Care Units (PICU), with limited number of beds and resource-intensive services, are a key component of flow and an important place for optimization. PICUs are crossroads for many patients and delays in moving them in or out can negatively impact clinical status and may decrease overall efficiency. Delays in moving patients out of the PICU, when no longer in need of critical care services, may mean that value-added services are being denied to other patients – a form of waste.

OBJECTIVE: Use real-time observation to describe utilization, flow through, and bottlenecks of PICU beds at a large, urban, academic children's hospital.

DESIGN/METHODS: A recording tool was developed through clinical and operational expert input and through iterative pilot use. It was then used to collect >20,000 bed-hours of real-time observation of patient flow in the pediatric intensive care unit (PICU) over 5 non-consecutive weeks.

RESULTS: 82% of bed-hours were used for critical-care value-added services, 8% on logistics, 9% on non-value-added uses, and 1% unclear. 95% of all bed-hours were consumed on 14 activities (see table).

PICU bed usage

Activity	Hours	Percent (%)
Ventilated patient	8995	45
Critical care NOS	3013	15
Neurosurgery, ICU	1531	8
Empty, unassigned	1524	8
Continuous infusion	936	5
Waiting floor bed assignment	919	5
Arterial line	508	3
High-flow nasal cannula	475	2
Environmental services	319	2
Post-ventilation (<12 hours)	226	1
In OR	224	1
Neurosurgery, post-ICU level	181	1
Unclear	169	1
Procedure underway	134	1
35 other activities (<99 hours each)	1006	5

There were wide variations in timing on certain logistical and non-value-added services, suggesting that bottlenecks can be identified and improved to maximize functional capacity.

CONCLUSIONS: Much time in the PICU was spent caring for patients at high levels of intensity. Identifiable periods of logistical and non-value-added occupancy were identifiable, as well as bottlenecks. Process improvement work can be directed at areas of delay uncovered by this systematic frontline analysis, to maximize functional capacity, which may improve quality (safety, efficiency, effectiveness, timeliness, patient-centeredness, equity), access, staff satisfaction, education, and value.

74

10:00 AM

Using Patient Satisfaction Scores To Identify Disparities in Care

Maria Petrini, Mariane Stefano, Alex Koster, Jobayer Hossain, Magdy Attia, Jay Greenspan, Iman Sharif.
General Pediatrics, Nemours/A.I. duPont Hospital for Children, Wilmington, DE.

BACKGROUND: Non-white race, lower literacy, and limited English proficiency predict lower patient satisfaction scores among adults. Identifying disparities in satisfaction in pediatrics can help lay the groundwork for designing interventions to improve health care delivery to underserved children.

OBJECTIVE: To compare emergency department (ED) satisfaction scores by race and preferred language.

DESIGN/METHODS: We analyzed ED Press-Ganey (PG) patient satisfaction surveys at a children's hospital between 2006-2009. Surveys were sent by PG to random samples of patients within 1 week of their visit (42 questions, Likert scale 1-5, 5="Top Box"). Surveys were sent in English unless the hospital database recorded Spanish as the family's preferred language.Using the hospital's database, survey responses were linked to patient demographics and ED visit variables. We used chi-square to compare satisfaction for each PG question by race and preferred language. Ordinal logistic regression was used to adjust for variables known to affect satisfaction: length of stay, acuity(emergent vs non-emergent), time before seeing first doctor,fast-track vs. core ED, Medicaid vs. other insurance.

RESULTS: 2601 PG surveys were returned; 21% (538) by non-white patients. Preferred languages in the hospital database were English(10%) and Spanish (2%); no data was recorded for the remaining 88%. Spanish surveys were returned for 39(2%) patients. Top-Box scores were less likely for nonwhite patients: "nurse courtesy"(60% vs. 69%,p<.0001); "trainee courtesy"(56% vs. 67%, p<.0001); "nurse attentive to needs" (60% vs. 69%p=0.009); "nurse listened" (62% vs. 69%, p=0.002); "resident listened" (57% vs. 67%, p<0.0001); "helpfulness of first person to ask about child"(57% vs. 66%, p<.0001); overall care (56% vs. 60%, p=0.03); "likelihood to recommend" (63% vs. 68%, p=0.13). In adjusted analysis, non-white race was inversely related to likelihood to recommend (adjusted B=-0.40, p<0.0001). Spanish vs. English surveys trended similarly: radiology staff courtesy(33% vs. 76%, p<0.0001); nurse courtesy(49% vs. 67%, p<.10); nurses listened (51% vs. 67%, p<.10).

CONCLUSIONS: Ethnic disparities in perceived care exist in a pediatric ED population. Further information is needed to determine if language barrier or cultural competence play a role in this disparity, so that appropriate interventions can be tailored to these underserved populations.

75 Fellow in Training

10:15 AM

Measuring Connectedness in the Health Care Setting: Reliability and Factor Analysis of the Adolescent-Physician Connectedness Scale

Monique J. Collier, Unab I. Khan, Jason Fletcher, Susan M. Coupey.
Pediatrics, Division of Adolescent Medicine, Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY; Family and Social Medicine, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Connectedness to important adults is a protective factor for adolescent risk behaviors. Extant scales measuring patient-physician interaction include some components of connectedness, but most are not adolescent specific.

OBJECTIVE: To develop and examine performance of the Adolescent-Physician Connectedness Scale (APCS).

DESIGN/METHODS: We reviewed medical practice guidelines and validated scales measuring the patient-physician relationship. From these sources, we identified five themes we believe encompass adolescent-physician connectedness: communication; trust; empathy; confidentiality; and respect. Adapting some items from validated scales and creating new items, we developed the 15-item APCS scale. Items such as "The doctor treated me with respect" and "The doctor showed concern for my well-being" were answered on a 5-point Likert scale (1=strongly disagree; 5=strongly agree). We pilot tested the APCS and revised the wording for clarity. We recruited a convenience sample of 320 adolescents from six urban primary care practices. Subjects completed the APCS and demographic questions immediately after their physician visit. Median age was 16 yrs (12-21); 66% female; 37% black; 59% Hispanic. Reliability was tested with Cronbach's alpha. Factor analysis was conducted using principal components analysis with Varimax rotation.

RESULTS: Of the 320 APCSs administered, 293 were valid for analysis. Mean Likert scale score on each of the 15 items ranged from 3.67 ± 1.30 to 4.57 ± 0.82 (3 items reverse-coded). The APCS demonstrated strong internal reliability with alpha of 0.887. Item total correlations were small for 2 items, both reverse-coded; removal of the 2 items slightly increased the alpha for the scale. The factor analytic solution for the APCS suggested a 2-factor model with 12 items loading on the initial factor and explaining 47.5% of the variance. The 3 reverse-coded items loaded on the second factor explaining 9.6% of the variance. We named this the "distrust factor" as items include "doctor not interested in me," "doctor did not listen to me," and "I worry that doctor may not keep information private."

CONCLUSIONS: The APCS has strong reliability and measures a nearly unidimensional construct. The second factor may measure a different construct or it may be that reverse phrasing confuses adolescent respondents. Future analysis will examine how the 3 items perform when not reverse-phrased.

Neurobiology I
Platform Session

Saturday, March 27, 2010
8:15 AM-10:30 AM

76

8:15 AM

Development of a Semiquantitative Fetal Brain Maturation Score on MRI

Daniel J. Licht, Catherine Limperopoulos, Adre J. du Plessis, James C. Gee, Jue Wu, Grady Hedstrom, Suyash P. Awate, Arastoo Vossough.
Neurology, The Children's Hospital of Philadelphia, Philadelphia, PA; School of Physical and Occupational Therapy, McGill University, Montreal, PA; Neurology, The Children's Hospital of Boston, Boston, MA; Radiology, Pennsylvania University, Philadelphia, PA.

BACKGROUND: Fetal diagnostic centers are increasingly relying on magnetic resonance imaging (MRI) of the fetus for surgical planning and prognosis counseling. Evaluation of central nervous system structures for lesions or malformations is standard practice. Assessment of fetal brain maturation is currently not available but may provide important prognostic data and facilitate the future study of human brain development in high-risk fetuses.

OBJECTIVE: To develop a valid, yet simple to use semiquantitative scale of fetal brain maturation that can be used in routine clinical fetal MRI.

DESIGN/METHODS: A semiquantitative scale and scoring system for assessing brain maturation was developed by major modifications to a previously validated ex-utero brain maturational score. Six visual indices, including myelination, presence and locations of the germinal matrix, frontal/occipital cortical folding, insular cortical folding, and sulcal depth of each of the superior and inferior temporal sulci were used. Thirty-one normal fetal brains were assessed via fetal MRI by two independent raters. The cumulative maturational score was correlated with gestational age and manually segmented fetal brain volumes. Regression models of gestational age and brain volume based on the indices was performed. The model was cross validated by the leave-one-out method.

RESULTS: The two independent raters had a correlation of $r=0.951$ ($p<0.001$) for the maturational score assessment. The correlation of the score with gestational age and segmented brain volume was $r=0.971$ ($p<0.001$) and $r=0.969$ ($p<0.001$), respectively. The regression analyses revealed adjusted squared multiple R of 0.938 and 0.932 for predicting gestational age and brain volume, respectively. The analysis also indicated that the scoring system can even be further simplified and yet maintain accuracy. The cross-validation analysis demonstrated excellent validity with $R^2=0.91$ for gestational age and $R^2=0.89$ for brain volume.

CONCLUSIONS: The study demonstrated the feasibility of developing an accurate and yet simple to use visual scale of brain maturation on routine fetal brain MR imaging. This scoring system, if validated in larger studies, may have potential to be used in assessment of fetal brain maturation during pregnancy.

77

Fellow in Training

8:30 AM

Maturational Arrest of Oligodendrocyte Lineage in Intraventricular Hemorrhage

Krishna Dummula, Govindaiah Vinukonda, Furong Hu, Muhammad T. Zia, Doreen Badheka, Praveen Ballabh.

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BACKGROUND: Intraventricular hemorrhage (IVH) predisposes premature infants to the development of cerebral palsy and cognitive deficits. We have developed a model of IVH in which premature rabbit pups with IVH exhibit hypomyelination, gliosis and motor impairment. Myelination failure after hypoxia-ischemia in rats is attributed to both degeneration and maturation arrest of preoligodendrocyte (pre-OL).

OBJECTIVE: To evaluate apoptosis, proliferation and maturation of oligodendrocyte (OL) lineage in premature rabbit pups with IVH (IVH pups) compared to pups without IVH (Non-IVH).

DESIGN/METHODS: Premature rabbit pups were delivered by C-section at 29 days of gestational age (term = 32d). They were alternately assigned to receive either intraperitoneal glycerol to induce IVH or, saline (control) at 2 h of postnatal age. The development of IVH and its severity were diagnosed by head sonogram at 24 h postnatal age. Coronal brain sections taken at the level of mid-septal nucleus and ventro-lateral nucleus of thalamus on postnatal day 3 were evaluated. Brain sections were labeled with TUNEL and O4 specific antibody to evaluate for apoptosis of OL. Ki67 and Olig2 immunostaining was employed to evaluate OL proliferation. O4 and O1 immunolabeling assessed OL maturation.

RESULTS: Apoptosis of O4+ OL was significantly higher in the periventricular germinal matrix and white matter (WM) of IVH pups compared to non-IVH controls ($P < 0.05$), but not in the cerebral cortex. There was an increase in the proliferation of cells of OL lineage in the germinal matrix of IVH pups compared to controls ($P < 0.05$), but not in the WM or cerebral cortex. A quantification of O4+ OL in the corona radiata, corpus callosum and internal capsule of the WM revealed that their density was comparable between IVH and non-IVH pups. However, O1+ OL (myelinating OL) were significantly lower in density in the corpus callosum and corona radiata of IVH pups compared to non-IVH controls ($P<0.05$), but not in the internal capsule.

CONCLUSIONS: Our data show increased apoptosis and compensatory proliferation of OL precursors in premature rabbit pups with IVH compared to non IVH controls. More importantly, myelinating OL were significantly reduced in IVH pups compared to the non-IVH controls, suggesting maturational arrest of OL lineage in pre-OL stage. We speculate that intervention to restore maturation of OL might prevent myelination failure in premature infants with IVH.

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Fellow in Training

8:45 AM

SS-31, a Mitochondria-Targeted Cytoprotective Peptide, Is Neuroprotective in Male but Not Female Neonatal Rats Following Cerebral Hypoxia-Ischemia

Marie T. Berg, Hazel S. Szeto, Queenie B. Brown, Jeffrey M. Perlman, Susan J. Vannucci.

Division of Newborn Medicine, Department of Pediatrics, New York Hospital, Weill Cornell Medical Center, New York, NY; Department of Pharmacology, New York Hospital, Weill Cornell Medical Center, New York, NY.

BACKGROUND: Neonatal hypoxia-ischemia (HI) is a significant cause of long-term infant morbidity and mortality. Neonates have increased vulnerability to oxidative damage and apoptotic cell death following HI, suggesting that protecting mitochondria should reduce cellular injury. SS-31 is a cell-permeable, mitochondria-targeted peptide, which has been shown to be protective in in vivo and in vitro models of ischemia-reperfusion injury, including following MCAO in the adult mouse. However, it has yet to be investigated in neonatal models.

OBJECTIVE: The purpose of this study was to determine whether SS-31 is neuroprotective in neonatal HI injury.

DESIGN/METHODS: P8 Wistar rat pups of both genders were subjected to unilateral cerebral HI according to our standard protocol of carotid artery ligation plus systemic hypoxia. SS-31 (5 mg/kg) or control vehicle (PBS), was injected sc 30 minutes pre-hypoxia and at 2h, 24h, and 48h post-HI. Animals were sacrificed at either 72h or 30 days. At 72h infarct area, regional damage scoring (cortex, thalamus, and hippocampal areas CA1, CA2, CA3, and dentate gyrus, each scored 0-3) and composite injury scoring (cumulative score 0-18) were assessed using H&E-stained cryosections. For analysis at 30 days, brains were preserved in FAM for morphometric analysis.

RESULTS: SS31 significantly reduced injury severity at 72h as measured by composite injury score among male pups (6.2 for SS-31-treated vs. 10.3 for controls, $p=0.0067$). The injury reduction was seen in the cortex, thalamus, and hippocampal regions CA1, CA2, and dentate gyrus. SS31 treatment was associated with reduced infarct size among male pups (infarct = 23% of right hemisphere in SS31-treated vs. 43% in controls, $p=0.006$). There was no injury reduction in female pups or at 30 days.

CONCLUSIONS: These results demonstrate a reduction in cerebral injury following treatment with SS-31 specifically in male pups at 72h post-HI. No reduction was seen in injury in female pups or at 30 days. Injury at 30 days was minimal, and a more severe injury may be required in order for treatment effect to be seen. This study provides evidence that mitochondria-targeted antioxidant therapy can be protective in neonates. Current literature supports a sexual dimorphism in apoptotic pathways following excitotoxic and oxidative insults both in vitro and in vivo which may underlie the differences reported here.

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Fellow in Training

9:00 AM

MRI and Neurosensory Impairment (NSI) in Infants with Hypoxic Ischemic Encephalopathy (HIE) Treated with Head Cooling (HC)

Raquel Gomez, Shobhana Desai, Marcy Gringlas, Susan Adeniyi-Jones.

Pediatrics Division of Neonatology, Thomas Jefferson University, Philadelphia, PA.

BACKGROUND: MRI can help predict outcome in infants with HIE. HC improves prognosis in HIE by modulating brain injury. We previously reported that the postcooling pattern of abnormality on brain MRI was predictive of neurodevelopment at 1-3 years of age when assessed by Bayley Scales of Infant Development (BSID III; PAS 2009). NSI also occurs after HIE and can adversely affect quality of life and is not well studied in this population.

OBJECTIVE: 1. To evaluate NSI and neurologic sequelae in a cohort of HIE infants treated with HC 2. To determine if MRI may help identify neonates at risk for NSI.

DESIGN/METHODS: A retrospective analysis of surviving infants with HIE treated with HC between 1/2005 and 9/2008, who had an MRI prior to discharge and were assessed by either a developmental neonatologist or a pediatric neurologist at 12-36 months, were studied. MRIs obtained at mean age of 10 days (range 4 - 60) were reviewed by a single radiologist and categorized as normal(Nl), predominant white matter abnormalities (WM), or multiple (grey + white matter) abnormalities (G+WM). No infant in this cohort had isolated grey matter abnormality. NSI was defined as cerebral palsy (CP) and seizures (Sz) at 1 year, feeding disorder as need for GT, cortical visual impairment (CVI) by pediatric ophthalmology, microcephaly <5th percentile (MC), and hearing loss (HL) by predischarge otoacoustic emmisions or later tympanometry. Nl, WM and GM+WM MRI groups were compared using unpaired student's test for continuous variables and Fisher's exact test for categorical variables.

RESULTS: Of the 131 infants treated with HC, 112 (85%) survived to discharge; of these 63 (56%) were followed to at least 1 year of age. Of the 63 infants, 38% had CP, 27% had Sz, 21% had CVI, 19% had SNHL, 17% had MC, and 33% had feeding disorder. The incidence of NSI by MRI category is shown in table.

MRI and NSI post SHC

	Nl (n=25)	WM Abnl (n=19)	GM+WMAbnl (n=19)	p value Nl vs. Mult
CP	2	6*	16	<0.001
Sz	1	7*	9	0.001
CVI	0	3	10	0.002
SNHL	0	5	7	0.005
MC	0	0	11	<0.001
Feeding Disorder	3	4*	14	<0.001

* Nl vs. WM p value 0.046

CONCLUSIONS: Infants with GM+WM MRI abnormalities had multiple NSI. 10% of infants with nl MRI had some NSI and are at risk for altered quality of life. These infants need close follow-up with early intervention.

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9:15 AM

Neural Recovery in Neonates Treated with Head Cooling: Early Motor Skills and Developmental Assessment at 12 Months

Susan V. Duff, Marcy Gringlas, Kanan Shah, Heather Aldridge, Shobhana Desai, Susan Adeniyi-Jones.

Physical and Occupational Therapy, Thomas Jefferson University, Philadelphia, PA; Pediatrics, Thomas Jefferson University/AI duPont Hospital, Philadelphia, PA; Rehabilitation, Thomas Jefferson University Hospital, Philadelphia, PA.

BACKGROUND: Term infants who sustain perinatal asphyxia are at risk for cognitive and sensorimotor dysfunction. Selective head cooling (SHC) in this group has been found to provide neuroprotective therapy and enhance outcome at 18 months of age. Yet, the impact of SHC on very early motor development and its relation to long term outcome has not been established. The Test of Infant Motor Performance (TIMP) has been used up to 4 months of age to discriminate infants at-risk for poor motor outcome (Campbell and Hedeker, 2001). Thus, the TIMP may be useful to assess motor performance over time and predict outcome in this population.

OBJECTIVE: To establish the usefulness and predictive validity of the TIMP in infants who sustained perinatal asphyxia and received SHC.

DESIGN/METHODS: Twenty-four term infants diagnosed with perinatal asphyxia who received SHC < 6 hours after birth (for 72 hours) participated. The TIMP was used to assess motor performance before discharge (mean 1.7 weeks) and at 2-4 months (mean 13.5 weeks). The BSID III was used to assess Cognitive, Language and Motor performance at one year of age (mean 13.2 months).

RESULTS: Mean neonatal TIMP score (TIMP 1) was 45.1 ± 19.4 with 8 infants (33.3%) scoring in the Average range. Mean TIMP score at 2-4 mo (TIMP 2) was 94.6 ± 16.7 with 21 infants (87.5%) scoring in the Average range. The mean rate of improvement from TIMP 1 to TIMP 2 was 5 points a week (.12 sd) with an overall increase of 45 points or 1 sd from TIMP 1 to TIMP 2. Mean BSID III scores were: Cognitive = 102 ± 18.4; Language = 95 ± 15.95; and Motor = 91.25 ± 19. TIMP 2 moderately correlated with the BSID III: Cognitive, $r = 0.63$ ($p<0.001$); Language, $r = 0.57$ ($p<0.003$); and Motor, $r = 0.53$ ($p<0.01$). TIMP 1 did not correlate with the BSID III.

CONCLUSIONS: Motor skill significantly improved from the neonatal period to 2-4 months for the majority of infants suggesting that SHC may have positively influenced neural recovery. The significant relation between motor performance at 2-4 months and developmental status at one year of age suggests that this neural recovery was sustained. With a larger cohort of infants and longer longitudinal follow-up, we hope to better determine if early motor performance can predict long term developmental outcome for this population.

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Fellow in Training

9:30 AM

Correlation of Proton Magnetic Resonance Spectroscopy (MRS) and Volumetric MRI of the Preterm White Matter

Erlita Gadin, David A. Paul, Amy Mackley, Kert Anzilotti, Karl Steiner, Michele Lobo, Kanik Sem, James C. Galloway.

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BACKGROUND: Periventricular white matter injury is common in premature infants. Volumetric MRI and MRS have been used to quantify alterations in the structure and biochemistry of the premature brain at term equivalent age. Few studies relating findings using both imaging techniques in the quantification of white matter injury in preterm infants have been reported.

OBJECTIVE: To investigate the relationship between white matter MRS metabolite ratios and volumetric MRI, of premature infants at term equivalent age, and to evaluate the effects of illness severity on both white matter volume and metabolite ratios.

DESIGN/METHODS: 20 infants born premature (<30 weeks) were evaluated with quantitative MRI and MRS at term equivalent age. Manual image segmentation was used to determine white matter volume. MRS, using a single voxel technique, was done on periventricular cortical white matter. Metabolites studied included: N-acetylaspartate (NAA), choline (Cho), and creatine (Cr). Score for Neonatal Acute Physiology (SNAP) was used to quantify illness severity. Statistical analysis included Pearson's correlation.

RESULTS: Infants in the study sample were 27±1.7 weeks gestation, BW 945±253 g. Their white matter volume was 116±18.3 ml. White matter volume did not correlate with NAA/Cr or Cho/Cr. However, there was a strong positive correlation with NAA/Cho. NAA/Cr and NAA/Cho had an inverse correlation with BW and GA. SNAP score had no correlation with the metabolite ratios. White matter volume did not correlate with BW, GA or SNAP score.

Correlation of WM Metabolite Ratios and WM Volume

	NAA/Cr	Cho/Cr	NAA/Cho	WM Volume
BW	-0.6*	-0.2	-0.6*	0.2
GA	-0.5*	-0.2	-0.5*	0.4
SNAP	0.1	-0.3	0.4	0.2
WM Volume	0.2	-0.3	0.7*	

Data presented as R coefficient; *denotes p<0.05

CONCLUSIONS: In our study sample, the NAA/Cho metabolite ratio strongly correlates with white matter volume. There were no correlations of metabolite ratios or white matter volume with illness severity. Our data suggest that reduction in NAA, a marker of neuronal function and an increase in Cho, a marker of cell membrane turnover, correlates with white matter volume loss. Behavioral and developmental evaluations over the first 2 years of life are ongoing to better understand the brain-behavior relationships in this population. *Funded by NIH R01 HD051748-02*

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9:45 AM

Reduced Effects of Gestational Cocaine Exposure (GCE) on Resting Cerebral Blood Flow (CBF) in Young Adults: A Follow-Up Study

Hengyi Rao, Hallam Hurt, Joan Giannetta, Marc Korczykowski, John Pluta, Laura Betancourt, Brian Avants, James Gee, Jiongjiong Wang, John Detre.

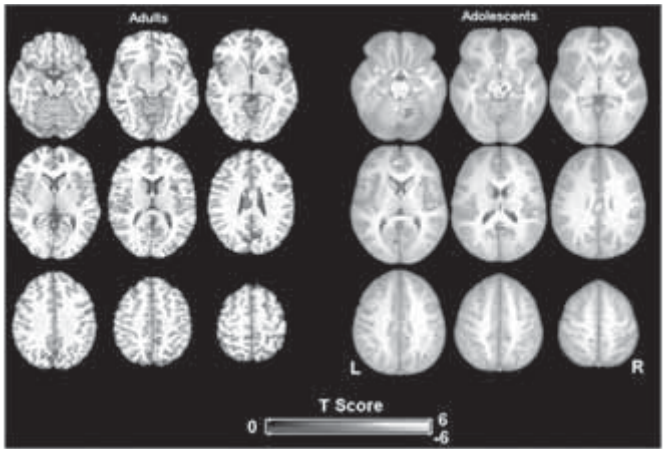
Neurology, University of Pennsylvania, Phila, PA; Pediatrics, The Children's Hospital of Philadelphia, Phila, PA; Radiology, University of Pennsylvania, Phila, PA.

BACKGROUND: Animal and human studies suggest long-term effects of GCE on brain structure and function. Previously, we used arterial spin labeling (ASL) perfusion fMRI in a longitudinal adolescent cohort with and without GCE. We found that, during adolescence, GCE was associated with significantly decreased global CBF and increased relative CBF in the frontal lobe. Using structural MRI, we also found that GCE was associated with decreased caudate volume which persisted into young adulthood.

OBJECTIVE: This study is a follow-up of our previous study. We used the same ASL method to examine whether the GCE effects on resting CBF will persist into young adulthood.

DESIGN/METHODS: 62 young adults (age 18-20 years, 24 male, 34 GCE) were scanned in a Siemens 3T Trio scanner. Of these, 36 have been scanned during adolescence. The two groups were matched in age, gender, SES and IQ. Voxel-wise general linear modeling was conducted for group comparison of resting CBF.

RESULTS: The GCE-related decreases in global CBF during adolescence did not persist into adulthood (GCE vs. Non-GCE, 56.6 vs. 57.8 ml/100g/min, $p > 0.6$). With a threshold of uncorrected $p < 0.001$, no differences were observed between the two groups. However, using a liberal threshold of uncorrected $p < 0.01$, GCE group showed a trend of relative CBF increases in insula and ventromedial prefrontal cortex when compared to the Non-GCE group. This pattern of differences is similar to our previous adolescent study but with reduced significance. The findings did not change when we performed the analysis in the subset of individuals that were scanned during both adolescence and adulthood.



CONCLUSIONS: In contrast to the persistent effects of GCE on brain structure, our findings showed reduced effects of GCE on resting CBF, suggesting that brain development from adolescence to adulthood may normalize the altered brain function induced by GCE.

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10:00 AM

Gestational Age + 5? Monitoring Autoregulation in the Preterm Infant

Maureen M. Gilmore, Brian Stone, Jennifer Shepard, Ken M. Brady.

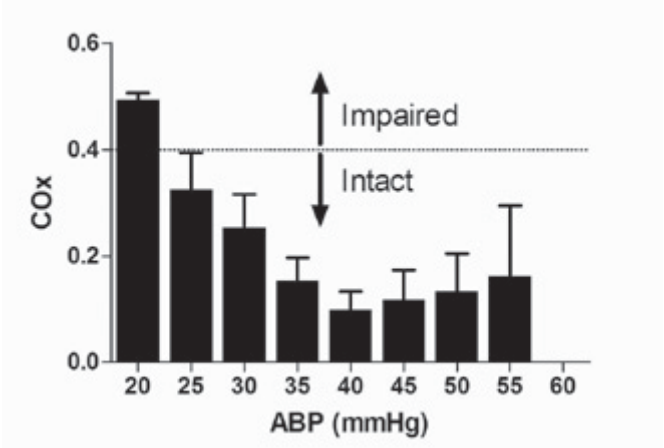
Pediatrics, Johns Hopkins Univ., Baltimore, MD; Anesthesia & Critical Care Medicine, Johns Hopkins Univ., Baltimore, MD.

BACKGROUND: Lack of cerebrovascular (CV) autoregulation has been associated with poor neurologic outcomes in preterm infants. Techniques to monitor autoregulation continuously with near-infrared spectroscopy (NIRS) have been developed and reported in animal models, and in traumatic brain injury with improved neurologic outcomes. We have a novel, non-invasive method of measuring the brain's pressure-autoregulation, the cerebral oximetry index (COx).

OBJECTIVE: We hypothesized that CV autoregulation would be variant across arterial blood pressure (ABP) in a preterm infant, delineating a lower limit below which autoregulation is impaired.

DESIGN/METHODS: Twenty-two infants born at mean gestational age 26.5 wks (range 24-30 wks) were monitored for 3 days (range 1-7 days) during their first week using COx. The COx is a moving, linear correlation coefficient between low-pass filtered samplings of ABP and cerebral cortical oxygen saturation measured with NIRS. A COx of zero indicates intact autoregulation, and +1 indicates pressure passivity. COx values >0.4 are associated with inadequate perfusion pressure in animal models. Since the COx is continuous it has the resolution to show ABPs that optimize the autoregulatory response.

RESULTS: For 22 patients, the combined autoregulation score is shown, stratified across ABP. There is a trend for improved autoregulation with increasing ABP up to 40 mmHg, then a worsening trend with further increases. All ABP data below 25 mmHg correlated with poor autoregulation. There are some neonates with >50% time spent with COx >0.5, indicating an abnormal response no matter how the ABP is managed.



CONCLUSIONS: Our pilot study suggests that some preterm infants ≤30 weeks do have intact CV autoregulation, and that a MAP equivalent to gestational age plus 5 is effective for most subjects. However, some neonates had >50% time with an abnormal COx indicating increased pressure passivity. Data analysis is in process to correlate these findings with ultrasound abnormalities and other clinical outcomes.

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10:15 AM

Chronic Intermittent Hypoxia Increases the Myogenic Tone of Rat Medium Cerebral Arteries

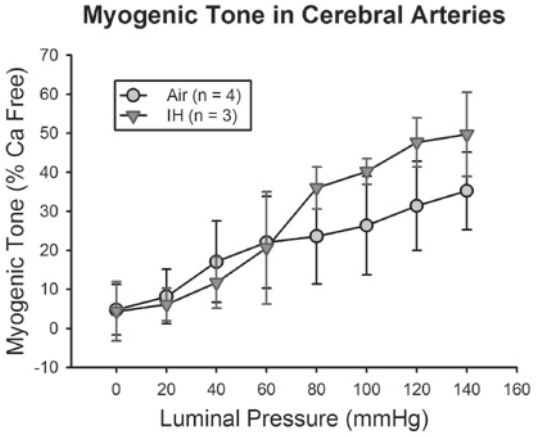
Vlad D. Ianus, Rayna J. Gonzale, Nancy L. Kanagy.
Pediatrics, Division of Neonatology, University of New Mexico, Albuquerque, NM; Cell Biology and Physiology, University of New Mexico, Albuquerque, NM; Basic Medical Sciences, University of Arizona College of Medicine, Phoenix, AZ.

BACKGROUND: Obstructive sleep apnea is associated with hypertension and increased cardiovascular morbidity, including stroke. Although the mechanisms responsible for this association are incompletely understood, intermittent hypoxia has been considered, along with the role of reactive oxidative species, shear stress, cathecolamines, increased synthesis of endothelin 1.

OBJECTIVE: To determine the role of eucapnic intermittent hypoxia (EIH) in alterations of the myogenic tone in rat medium cerebral arteries (MCA).

DESIGN/METHODS: Sprague-Dawley rats were exposed to either EIH (5% O2, 5% CO2) or sham cycling for 28 days. At the end of treatment, the rats were euthanized and decapitated. The MCA were isolated and cannulated with glass micropipettes, perfused and superfused with heated physiological saline solution (PSS), equilibrated with 21% O2, 6% CO2 at physiologic pH. The inner diameter of the pressurized arteries was recorded by videomicroscopy connected to a data acquisition computer. Intraluminal arterial pressure was increased in 20mmHg increment steps to 140mmHg. The experiment was then repeated while arteries were superfused with Calcium-free PSS. Active myogenic tone was calculated as a percent change in inner myogenic tone at a certain intraluminal pressure (diameter in Ca^{2+} containing PSS – diameter in Ca^{2+} free PSS) when compared to the maximal inner diameter recorded in Ca^{2+} PSS.

RESULTS: The myogenic tone of MCAs from rats exposed to EIH was increased when compared to the tone of MCAs from sham treated animals at the same intraluminal pressure –



CONCLUSIONS: Chronic intermittent hypoxia may be responsible for increases in the myogenic tone in rat medium cerebral arteries. Futher experiments are being conducted to determine the role of reactive oxygen species and endothelium mediated dilation.

Infectious Diseases Platform Session

Saturday, March 27, 2010
8:15 AM-10:30 AM

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Fellow in Training

8:15 AM

Cerebrospinal Fluid (CSF) Cytokines Are Predictors of Bacterial Meningitis in Infants

Lakshmi Srinivasan, Laurie Kilpatrick, Samir S. Shah, Soraya Abbasi, Shelley Rankin, Michael A. Padula, Karin L. McGowan, Kaitilin Mahoney, Mary C. Harris.
Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA; Physiology, Temple University School of Medicine, Philadelphia, PA; Pediatrics, Pennsylvania Hospital, Philadelphia, PA; Microbiology, University of Pennsylvania School of Veterinary Medicine, Philadelphia, PA.

BACKGROUND: Bacterial meningitis causes significant morbidity and mortality. Lumbar puncture (LP) is often deferred in critically ill infants, and antibiotics administered presumptively, thereby reducing the yield of cultures. The accuracy of pro- and anti-inflammatory cytokines in predicting bacterial meningitis is unclear.

OBJECTIVE: To examine the predictive ability of CSF cytokines in the diagnosis of bacterial meningitis in infants.

DESIGN/METHODS: This prospective, multi-center study included infants <6 mos undergoing LPs. Pro- and anti-inflammatory cytokines were measured using a cytometric bead array. Bacterial meningitis was defined in two ways: 1) Positive CSF culture and 2) Positive Gram stain, or CSF pleocytosis with either CSF protein >120 mg/dL or CSF glucose <20 mg/dL (consensus definition).

RESULTS: 261 subjects had a median GA of 35 wks [interquartile range (IQR): 28-39] and a median PNA of 6d [IQR 2–30]. Overall, 7 (2.6%) had meningitis by positive cultures and 30 (12.1%) by consensus definition. Bacteria isolated from CSF included GBS(3), S. aureus(1), CONS(1), Enterococcus(1) and α-hemolytic streptococcus(1). 83% received antibiotics prior to LP. Cytokine levels differed significantly between those with and without bacterial meningitis, either by culture or consensus definition [Table]. While IL-10 most accurately predicted bacterial meningitis (AUC=0.874), a combination of TNFα and IL-6 was also highly predictive (LR 30.1, AUC 0.827).

	Meningitis by Positive Culture		Meningitis by Consensus Definition	
Cytokine	Yes	No	Yes	No
TNFα	1476.8 ± 2016.4	1.1 ± 2.7*	344.6 ± 1115.7	1.3 ± 3.4*
IL-1	1032.9 ± 1818.8	3.0 ± 8.8*	241.1 ± 938.1	2.9 ± 17.2*
IL-6	2360.5 ± 2294.2	135.9 ± 586.8*	887.6 ± 1613.5	96.8 ± 490.7*
IL-8	2819.7 ± 2190.9	825.6 ± 1399.1*	2356.4 ± 2181.9	700.7 ± 1234.2*
IL-10	223.7 ± 409.2	3.2 ± 8.6*	55.1 ± 207.9	2.99 ± 11.3*
IL-12	2.9 ± 4.1	1.5 ± 3.4†	1.7 ± 3.6	1.5 ± 3.4†

Pg/mL, mean ± SD; *P <0.001; †P-value=0.24

CONCLUSIONS: CSF IL-10 elevations suggest a marked anti-inflammatory response in bacterial meningitis. Further, CSF cytokines, individually and in combination, have the potential to diagnose bacterial meningitis with high sensitivity, particularly in the setting of antibiotic pre-treatment.

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8:30 AM

Effect of Comprehensive Infection Control Measures on the Rate of Late Onset Infection in Very Low Birth Weight Infants

Linda Wicker, Judy G. Saslow, Sahil Shah, Vishwanath Bhat, Sulaiman Sannoh, Nicole Kemble, Emma Brandon, Kee H. Pyon, Gary E. Stahl, Zubair H. Aghai.
Pediatrics/Neonatology, Cooper University Hospital-UMDNJ-Robert Wood Johnson Medical School, Camden, NJ.

BACKGROUND: Late onset infection is a significant problem in very low birth weight (VLBW) infants (birth weight ≤1500 grams) and can lead to increased mortality and morbidity. The incidence of late onset infection in VLBW infants in our Neonatal Intensive Care Unit (NICU) was > 35% before 2004, much higher than 20% reported in other studies. A comprehensive infection control measure was introduced in 2004 to decrease the late onset infection rate in the NICU. The infection control measures incorporated education guidelines for NICU staff and environmental improvements to the NICU.

OBJECTIVE: To study the effects of comprehensive infection control measures on the rate of late onset infection in VLBW infants.

DESIGN/METHODS: VLBW infants who were born between January 2001 and December 2004 (pre-intervention group) were compared with infants who were born between January 2005 and December 2008 (Intervention group). Late onset infection was defined as a positive blood and/or CSF culture after 3 days of life. Demographic and clinical data were collected from infants' medical records. The two groups were compared for baseline demographics, risk factors for infection and the rate of late onset infection.

RESULTS: 350 VLBW infants were admitted to NICU during pre-intervention period and 315 during intervention period. There was no significant difference in baseline demographics and risk factors for late-onset infection {birth weight, gestational age, sex, race, prenatal steroids, prenatal antibiotics, prolonged rupture of membranes, Apgar scores, duration of central lines, duration of total parenteral nutrition (TPN), postnatal steroids and mechanical ventilation} between the two groups. The incidence of late-onset infection was significantly reduced from 36% before intervention to 22% with intervention (p<0.001).

	Pre-intervention Group (n=350)	Intervention Group (n=315)	p
Birth Weight (g)	1020±281	1005±317	0.5
Gestational Age (w)	27.8±2.8	27.7±3.0	0.7
Mechanical Ventilation (days)	21.8±27.6	21.2±29.4	0.8
Central Lines (days)	22.1±17.1	21.4±18.1	0.7
TPN (days)	21.8±17.9	20.9±19.6	0.6
Late Onset Infection (%)	126 (36)	69 (21.9)	<0.001

CONCLUSIONS: Comprehensive infection control measures significantly reduced the rate of late onset infection in VLBW infants.

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Medical Student

8:45 AM

How Quickly Are Blood Cultures Positive in Infants? A Prospective Study

Michael A. Padula, Maya L. Dewan, Samir S. Shah, Karin L. McGowan, Kaitilin R. Mahoney, Mary C. Harris.
Children's Hospital of Philadelphia, Philadelphia, PA; University of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: Bloodstream infections are an important cause of morbidity among infants requiring intensive care. Time to blood-culture positivity (TtP) has been used to differentiate among microorganisms and guide appropriate therapy, but available information regarding infants is limited.

OBJECTIVE: To evaluate whether organism type and site of culture affect time to detection of positive blood cultures in infants.

DESIGN/METHODS: This prospective cohort study included infants hospitalized in a single neonatal intensive care unit between July 2006 and October 2009 for whom a blood culture was drawn for suspected sepsis. Indication(s) for culture, culture site and volume were documented by a clinician at the time of collection.

RESULTS: Blood cultures were positive in 201 (16.7%) of 1203 samples from 107 (21.4%) of 500 infants. The overall median TtP was 18.3 h (interquartile range (IQR)= 12.7 – 27.7 h) among infants with a median age= 42 d and GA= 28 wks. Gram-positive (GP) organisms, n= 144 (71.6%) were predominant with coagulase-negative Staphylococcus (CONS), n=109, representing 54.2% of all cultures followed by S. aureus (n=20) and Enterococcus (n=13). Among Gram-negative (GN) bacteria, n=50 (24.9 %), E.coli (n=13), Klebsiella (n=12) and Enterobacter (n=11) were most common. Polymicrobial isolates, n= 3 (1.5%), and Candida sp., n=4 (2.0%), were rare. TtP for CONS differed vs. non-CONS GP (p=0.001) and GN (p<0.001) subgroups.

Organism Type	N (%)	Time (h) - median (IQR)
CONS	109 (54)	20.8 (16.3 – 36.7)
Non-CONS Gram-Positive	35 (17)	14.8 (12.1 – 18.7)
Gram-Negative	50 (25)	13.1 (10.8 – 17.8)
Polymicrobial	3 (1.5)	8.5 (8.5 – 10.7)
Fungal	4 (2)	35.2 (18.1 – 52.9)

At 48 hours, 90.8% of CONS isolates were detected, compared with 94.3% detection of all other bacteria. Central line cultures, n=77, had a significantly shorter TtP, 15.2 h (10.3 – 22.2 h) (median (IQR)), compared with peripheral sites, n=144, 19.8 h (14.7 –31.6 h), (p=0.003), although culture volume did not differ significantly.
CONCLUSIONS: Time to detection of positive blood cultures varied significantly by organism type and site of culture. Bloodstream infections with Gram-negative organisms were detected most quickly. CONS, the most commonly detected organism, had the longest TtP among all bacteria, and fungal cultures had the longest TtP of all organisms. Isolates from central lines were detected sooner than those drawn peripherally.

88 Fellow in Training

9:00 AM

Cost Effective and Safe Management of Early Onset, Asymptomatic Presumed Neonatal Sepsis with Intramuscular Antibiotics

Binta Lambert, Koryse Woodrooffe, Deborah E. Campbell, Suhas M. Nafday.
Pediatrics - Neonatology, Children's Hospital at Montefiore - Weiler, Bronx, NY; Pediatrics-Neonatology, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Presumed neonatal sepsis in the term infant remains the most common admission in the Neonatal Intensive Care Unit (NICU). Despite broad agreement for management of symptomatic neonates, the management issues related to asymptomatic, early onset presumed neonatal sepsis remains controversial.
OBJECTIVE: To evaluate the outcomes, utility, safety, and cost benefit of intramuscular antibiotics (IM) administered in the regular newborn nursery (NBN) for the treatment of presumed neonatal sepsis in asymptomatic term neonates.
DESIGN/METHODS: Our protocol for treatment of presumed sepsis in asymptomatic full term neonates ³ 2000 grams at birth includes intramuscular ampicillin and gentamicin, until cultures of blood and/or CSF are negative for 48-72 hours with close monitoring in the NBN. Retrospective review of this cohort was undertaken from July 2001 to July 2008. Failure of IM antibiotic treatment was considered, if the neonate became symptomatic, had positive blood or CSF cultures or was readmitted for sepsis within two weeks of nursery discharge. Data were analyzed for the relationship between key predictors to the presence of neonatal bacterial infection and a failure of IM antibiotic treatment. Cost savings were based on the current NICU and NBN admission reimbursement rates from Medicaid for institutional as well as for physician billing.
RESULTS: Total Admissions in NBN-29, 698 → Sepsis Evaluations-5, 040 (17%) → Treated with IM Antibiotics 421(8.4%) → Failure of IM Antibiotics -14 (3.3%) {Symptomatic within first 24 hours: 7, Positive Blood or CSF culture: 6, Readmission for a possible contamination in Blood Culture (asymptomatic): 1} None were hemodynamically unstable. The number of newborns who failed the IM antibiotic therapy (14) was so small that none of the risk factors including leukopenia, leukocytosis and/or elevated I: T ratio predicted failed IM antibiotics therapy. There was a trend towards statistical significance in the duration of ROM<18 hours. No infant had adverse events associated with intramuscular drug administration, namely injection site abscess.
CONCLUSIONS: Use of IM antibiotics is a reasonable, safe alternative to IV antibiotics in the treatment of asymptomatic term newborns with presumed neonatal sepsis. 2. There is a substantial cost savings in caring for asymptomatic neonates with presumed sepsis in the newborn nursery compared to NICU costs.

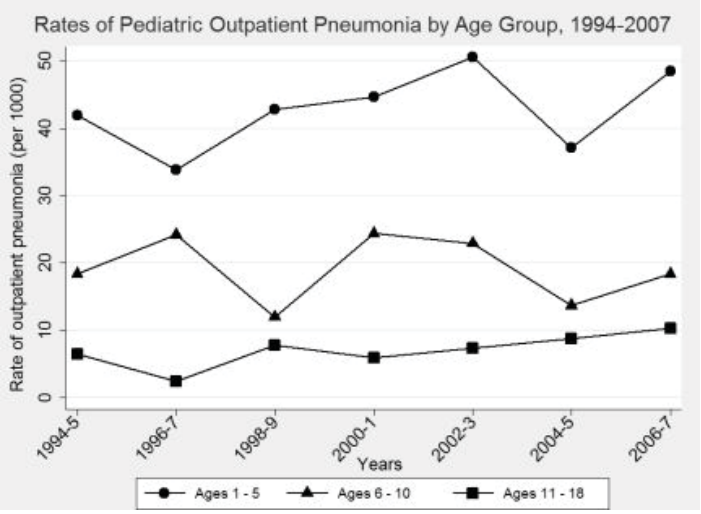
89 Fellow in Training

9:15 AM

National Childhood Pneumonia Rates and Trends in Antibiotic Prescribing, 1994-2007

Matthew P. Kronman, Rui Feng, Yuan-Shung Huang, Grace E. Lee, Samir S. Shah.
Divsion of Infectious Diseases, Children's Hospital of Philadelphia, Philadelphia, PA; Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania, Philadelphia, PA; Department of Pediatrics, Health Analytics Unit, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: National rates of outpatient pediatric CAP are unknown. No pediatric CAP management guidelines exist, and outpatient prescribing for CAP has not been assessed nationally.
OBJECTIVE: To determine rates of CAP by age group and trends in antibiotic use for CAP from 1994-2007.
DESIGN/METHODS: We combined data from the CDC's 1994-2007 National Ambulatory and National Hospital Ambulatory Medical Care Surveys (NAMCS, NHAMCS). We included children 1-18 years with outpatient pneumonia and excluded children admitted at initial visit and those with chronic medical conditions (except asthma). We determined CAP rates over two-year intervals to ensure robust national estimates. Prescribed antibiotics were categorized as penicillins (penicillin or amoxicillin), macrolides, cephalosporins, or other. Poisson regression was used to determine changes in rates of pneumonia and antibiotic prescribing.
RESULTS: Annual rates of CAP were highest in 1-5 year-olds at 33.8-50.5/1000, and lowest in 11-18 year-olds at 2.4-10.3/1000. We identified no significant changes in CAP rates in any age group over the 14 year study period (p=.87, .30, and .22 for ages 1-5, 6-10, and 11-18 respectively). Macrolides were prescribed in 31.4-46.9% of cases, cephalosporins in 13.5-35.8%, penicillins in 5.6-31.3%, and other antibiotics (amoxicillin/clavulanate, sulfonamides, or tetracyclines) in 22.1-41.8%. Poisson regression demonstrated increasing macrolide use (p=.001) and decreasing penicillin use (p=.002) among children 11-18 years but no trends in antibiotic use in the younger age groups.
CONCLUSIONS: We present national estimates of pediatric CAP incidence by age group. Despite the introduction of a successful pneumococcal vaccine (targeting the most common bacterial cause of CAP) in 2000, pneumonia diagnoses have not decreased nationally since 1994. Macrolide use for CAP increased over the study period, although there are reports of increasing pneumococcal resistance to macrolides and there is no evidence that macrolides improve CAP outcomes.



90 House Officer

9:30 AM

Extrapulmonary Manifestations of Mycoplasma Pneumonia in Children

Susmita Senepati, Fernanda Kupferman, Louis H. Primavera, Susana Rapaport, Dakshayani Guttal.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Psychology, Touro College, NY, NY.

BACKGROUND: Mycoplasma pneumonia (MP) is one of the most common type of community-acquired pneumonia in children. Although the disease usually presents with respiratory symptoms, there has been increasing evidence of extrapulmonary manifestations (EPM).
OBJECTIVE: To determine the extrapulmonary manifestations of MP in the pediatric population.
DESIGN/METHODS: This was a descriptive, retrospective study. Children 0-18 years of age admitted to an urban community hospital with MP from July 2007 to July 2009 were identified through the records of the microbiology laboratory. MP infection was defined by a positive serological test for IgM antibody against MP. The medical records of all such children were reviewed, but those with laboratory or other evidence of additional infections were excluded from further analysis. Demographic data, including age, gender and ethnicity were extracted, and clinical manifestations recorded and categorized according to the systemic involvement as follows: dermatological (D) for any abnormal mucocutaneous lesion; neurological (CNS) for any clinical acute neurological deficit or radiological abnormality; hematological (H) for any abnormal cell count for age; cardiac (C) for functional or anatomical acute cardiovascular dysfunction; musculoskeletal (M) for acute elevation of CPK enzyme; and acute febrile illness without focus (AFI).
RESULTS: We reviewed 216 patients with documented IgM-positive MP infection. 10 patients were excluded for other infections. EPM were noted in 52 patients (25.6%), of whom 34 (65.4%) had no pulmonary symptoms (X^2= 81.2, $p < 0.001$; OR = 0.033). Dermatologic conditions were seen in 14 patients (6.8%); of these, 64% had maculopapular rash, 14% each had utricaria or erythema multiforme, and 7% had Stevens-Johnson syndrome. D conditions occurred more commonly in Asians (X^2= 10.7, $p < 0.02$) as maculopapular rash (X^2= 17.6, $p<0.02$). CNS involvement was seen in 8 (3.9%) patients, of whom 25% each had seizures, aseptic meningitis or peripheral neuropathy, and 12.5% had either pseudotumor cerebri with cranial neuropathy or headaches. Four children (1.9%) had hematological manifestations, all with neutropenia, 4 children (1.9%) had cardiac involvement (all Kawasaki syndrome), one (0.5%) had musculoskeletal involvement with arthralgia, and 10 (4.9%) had AFI.
CONCLUSIONS: Extrapulmonary manifestations are not uncommon with MP infection in children and are more likely to occur without respiratory symptoms.

91 Fellow in Training

9:45 AM

n-3 Polyunsaturated Fatty Acids EPA and DHA Inhibit Pro-Inflammatory Cytokine Release

Michael M. Espiritu, Hong Lin, Susanna Cunningham-Rundles, Jeffrey M. Perlman.
Division of Newborn Medicine, Department of Pediatrics, Weill Cornell Medical College, New York City, NY; Cellular Immunology Laboratory, Department of Pediatrics, Weill Cornell Medical College, New York City, NY.

BACKGROUND: Recent attention has been given to potential anti-inflammatory effects of n-3 polyunsaturated fatty acids (PUFA) eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Neonates are especially vulnerable to inflammation which plays a pathogenetic role

in chronic lung disease and cerebral white matter injury. We hypothesized that EPA and DHA modulate cytokine response to lipopolysaccharide (LPS) in monocytes *in vitro* and cord blood *ex vivo* as a model of neonatal inflammation.
OBJECTIVE: To determine whether pretreatment with EPA and DHA reduces pro-inflammatory cytokine responses.
DESIGN/METHODS: Monocytes derived from human leukemic cell line THP-1 were used to develop a model system. After differentiation in vitro, cells were cultured with/without EPA or DHA at 25 or 100 μM for 48h, then stimulated with LPS for 24h. Culture supernatants were collected and analyzed for cytokines TNF-α, IL-6, IL-10, and IL-12 using validated ELISAs. Neonatal cord blood samples were freshly obtained, incubated with/without EPA or DHA for 24h, then stimulated with LPS for 18h. Supernatants were collected and tested.
RESULTS: Treatment of THP-1 monocytes with DHA or EPA significantly inhibited IL-6, IL-10, and IL-12 responses to LPS in a dose dependent manner (Tab.1). Significant inhibition of TNF-α levels was seen after pre-culture with DHA but not EPA. Preliminary data in 4 neonatal cord blood samples show similar reduction in IL-12 response by ~30% ($p<0.005$). Studies of other cytokine responses are are still pending.

Cytokine Response to LPS after Treatment with EPA or DHA

	LPS Alone (%)	EPA 100μM (%)	EPA 25μM (%)	DHA 100μM (%)	DHA25μM (%)
IL-6	100	43±11*	69±14*	9±1*	48±5*
TNF-α	100	110±6	111±12	54±9*	131±12
IL-10	100	55±4*	70±3*	38±2*	54±4*
IL-12	100	21±3*	38±5*	22±4*	34±5*

* $p < 0.005$; Values normalized as % of cytokine specific response to LPS without fatty acid treatment

CONCLUSIONS: Treatment with the n-3 fatty acids EPA and DHA inhibits pro-inflammatory cytokine response to LPS *in vitro* and *ex vivo*. The inhibitory effect on IL-10 and IL-12 are novel. While still in progress, preliminary experiments with neonatal cord blood show analogous effects. These findings suggest a potential role for DHA and EPA as nutritional modifiers of neonatal inflammation.

92 Medical Student

10:00 AM

Prevalence and Pattern of Disclosure of HIV Status in HIV-Infected Children in Ghana

Stacey Kallem, Lorna Renner, Musie Ghebremichael, Elijah Paintsil.
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BACKGROUND: With the advent of highly active antiretroviral therapy (HAART), HIV-infected children are surviving into adulthood. There is evolving evidence that the disclosure of the HIV status to HIV-infected children has psychological benefits and positive effects on the clinical course of the disease. When and how to disclose the diagnosis of HIV to children remains a clinical dilemma. There is paucity of data from resource limited settings on disclosure.
OBJECTIVE: To investigate the prevalence, pattern, and determinants of HIV disclosure in HIV-infected children in Ghana.
DESIGN/METHODS: A cross-sectional study from the Pediatric HIV Clinic at Korle-Bu Teaching Hospital (Accra, Ghana) was conducted. The children and their caregivers were interviewed separately and their medical records were reviewed. HIV disclosure status was based on the concordance between report by the caregiver and the child. Fisher's exact tests were used to compare categorical variables between children who knew their HIV status and those who did not know. Wilcoxon rank sum tests were used for continuous variables. Multivariate analyses using logistic regression models were employed to examine the predictors of HIV disclosure.
RESULTS: Seventy one caregiver-child dyads were enrolled. The children were aged from 8 to 14 years. The prevalence of disclosure was 21%. The mean age at disclosure was 11.72 years. The demographic characteristics associated with disclosure were age of the child ($p<0.01$), the level of education of child ($p<0.01$), deceased biologic father ($p=0.02$), administration of own HIV medications ($p=0.02$), and longer duration on HIV medication ($p=0.02$). Socio-economic status of caregiver, WHO clinical staging, and CD4-T lymphocyte count at the time of interview were not associated with disclosure. Age, level of education of the child, deceased biologic father, administration of own HIV medication remained the main predictors of HIV disclosure status, after logistic regression.
CONCLUSIONS: We found a lower rate of HIV disclosure than reported for most resource rich countries. However, the main predictors of disclosure, age and the level of education, were consistent with findings from resource rich countries. Our findings underscore the need for a systematic and a staged approach of pediatric HIV disclosure in resource limited countries in providing support and a skill set for caregivers to use.

93 Resident

10:15 AM

Use of the Rapid HIV Test in the Newborn and Cord Blood

Laura Malaga, Prabi Rajbhandari, Juhi Purswani, Stefan Hagmann, James Dunne, Murli Purswani.
Bronx-Lebanon Hospital Center, Bronx, NY; Irvington High School, Irvington, NY.

BACKGROUND: The rapid HIV test (R-HIV) has replaced the standard HIV ELISA that used to be performed as part of the two-test algorithm for diagnosing HIV infection. They are classified as point-of-care tests, yielding a result in less than 30 minutes, with sensitivities and specificities similar to the ELISA. The OraQuick® Advance Rapid HIV-1/2 Antibody Test (OraQuick®) manufactured by OraSure Technologies, Inc, PA, is FDA-approved for use in individuals ≥12yo. The accuracy of OraQuick® has not been established in children <12yo.
OBJECTIVE: To determine the sensitivity and specificity of the OraQuick® R-HIV compared to the gold standard HIV ELISA when used to test for HIV in blood obtained from newborns and in umbilical cord plasma.
DESIGN/METHODS: Cord plasma and blood from babies born to HIV-infected and uninfected women in a community hospital served as the source of antibody positive (HIV+) and negative (HIV-) samples. Between 5-10 extra drops of blood were collected from the newborn heelstick performed at the time of the newborn metabolic screen. Unused stored cord blood was retrieved, and plasma obtained after centrifuging. Each newborn blood sample and corresponding cord plasma were assigned a unique study number after all patient identifiers were removed, and were tested using both the HIV ELISA (Siemens, NY) and the OraQuick®. The study was approved by the hospital's Institutional Review Board.
RESULTS: From 6/2009 to date, a total of 45 (8 HIV+ and 37 HIV-) samples have been collected from babies between 36-42 weeks gestational age. Newborn blood samples showed complete correlation between the two testing methods, 8/8 HIV+ and 32/32 HIV- [table 1]. For 5 HIV- samples, there was insufficient blood available for HIV ELISA testing. Cord plasma also showed complete correlation, 6/6 HIV+ and 31/31 HIV- [table 2]. For 2 HIV+ and 6 HIV- samples, cord blood could not be retrieved.

Table 1. Newborn Blood

		HIV ELISA (Standard)	
		Positive	Negative
OraQuick®	Positive	8	0
(R-HIV)	Negative	0	32

Table 2. Cord Plasma

		HIV ELISA (Standard)	
		Positive	Negative
OraQuick®	Positive	6	0
(R-HIV)	Negative	0	31

CONCLUSIONS: These results reveal that when testing for HIV in newborn blood and cord plasma, the OraQuick® is 100% sensitive and specific, and is comparable to the HIV ELISA. The number of HIV+ women in our study was small. However, the study is ongoing in order to increase the sample size and determine if the sensitivity and specificity obtained are preserved.

Endocrinology / Obesity Platform Session

Saturday, March 27, 2010
8:15 AM-10:30 AM

94 Fellow in Training

8:15 AM

Familial Short Stature Due to a Novel Splice Site Mutation in the *SHOX* Gene

Jennifer Danzig, Michael A. Levine.
Division of Endocrinology, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Haploinsufficiency of the pseudoautosomal homeobox gene *SHOX* causes short stature and skeletal defects in patients with Leri-Weill and Turner syndromes. Homozygous *SHOX* mutations cause Langer Mesomelic Dysplasia with marked shortening and underdevelopment of long bones. In contrast, *SHOX* polypoidy is associated with tall stature. The variable skeletal phenotypes in these syndromes suggest a quantitative relationship of functional protein to bone development and growth.
OBJECTIVE: Molecular characterization of familial short stature in a unique kindred.
DESIGN/METHODS: We studied non-consanguineous parents and their three children (two males, one female), each of whom had postnatal growth failure with height Z scores ranging from -2.4 to -1.7. Skeletal development was otherwise normal. Genomic DNA was extracted from peripheral blood cells and the exons and flanking intronic sequences of the *SHOX* gene were amplified by PCR and analyzed by DHPLC and direct DNA sequencing.
RESULTS: Each child was heterozygous for a novel splice acceptor site mutation in intron-1 of the *SHOX* gene (IVS1-3C>A or c.1-435C>A). The mother (155 cm) had wild type *SHOX* alleles, but the father was homozygous for the c.1-435C>A mutation. He was short (152.4 cm) but physical examination and skeletal survey were normal; his father (160 cm) and mother (155 cm) had both been moderately short. Haplotype analysis of the father's DNA using SNPs linked to *SHOX* was consistent with a previous pseudoautosomal crossover of the mutation from an X to Y chromosome during male meiosis; presumed consanguinity likely led to homozygosity of c.1-435C>A. Review of a database of >6100 patients with short stature revealed this substitution in only one additional unrelated patient and no subject with normal stature. *In silico* analyses (SplicePort) indicated a moderately reduced score value (1.09 v 2.47, threshold 0) for the for the mutant allele.
CONCLUSIONS: We report a novel *SHOX* gene splice site mutation in a family with idiopathic short stature. The variable heights in affected members of this family and absence of specific skeletal dysplasia in the homozygous father are consistent with a splice site aberration within the mutant *SHOX* allele that allows some functional SHOX protein to be produced through normal splicing of the defective transcript. Finally, this family illustrates a rare recombination event within the PAR1 region that explains homozygosity of a *SHOX* mutation with male transmission of mutant alleles to sons and a daughter.

95

8:30 AM

Associations between Obesity, Asthma and Inflammation in Inner-City Adolescents

Unab I. Khan, Carmen R. Isasi, Susan M. Coupey, Deepa Rastogi, Christopher Andrade.
Department of Pediatrics, Albert Einstein College of Medicine, Bronx, NY; Department of Epidemiology & Population Health, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Both obesity and asthma are highly prevalent in inner-city African American (AA) and Hispanic (H) adolescents. Obesity is a known independent risk factor for cardiovascular disease (CVD), and is associated with elevated C reactive protein (CRP), a marker of systemic inflammation. CRP is a strong risk factor for CVD. Due to underlying inflammation, asthma has also been proposed as a potential risk factor for CVD. Studies in adults report higher CRP levels in asthmatics, but fail to account for co- morbid obesity. The association of obesity, asthma and CRP is not known in adolescents.
OBJECTIVE: To examine the independent and synergistic effects of obesity and asthma on CRP in inner-city AA and H adolescents.
DESIGN/METHODS: 129 adolescents were recruited in four categories: 1) Normal weight non-asthmatics (NWNA); 2) Normal weight asthmatics (NWA); 3) Obese non-asthmatics (ONA); 4) Obese asthmatics (OA). Those with acute or chronic inflammatory illnesses or using systemic steroids in three months prior to recruitment were excluded. CRP was measured using an immunonephelometric assay. Groups were compared using ANOVA and Chi square test.
RESULTS: Although CRP levels were different between the four groups, within-group differences were significant only by obesity, not by asthma status.

Comparison of Variables between groups

N= 129	NWNA (31)	NWA (19)	ONA (43)	OA (36)	p
Age (mean yrs. ± sd)	17.4 ± 2.1	16.3 ± 2.4	15.8 ± 2.3	15.2 ± 1.9	< 0.001
Sex (girls/boys)	26/5	12/7	31/13	20/16	0.09
Race (AA/H)	10/21	5/14	17/26	20/16	0.118
BMI (mean ± sd)	22.8 ± 3.0	21.9 ± 3.0	38.1 ± 7.5	37.8 ± 5.5	< 0.001
CRP(geometric mean ± sd)	0.59 ± 3.7	0.87 ± 3.0	2.2 ± 3.0	2.80 ± 2.8	< 0.001

In multivariate analyses adjusted for age, sex and race, obesity was associated with CRP in both asthmatics (β: 1.45, p <0.001) and non-asthmatics (β: 1.28, p<0.001), while asthma was not associated with CRP in either obese (β: 0.506, p= 0.18) or normal weight groups (β: 0.138, p= 0.77). Effect modification was not observed (p-interaction=0.683).
CONCLUSIONS: In inner-city AA and H adolescents, obesity but not asthma, is associated with elevated CRP levels. Unlike adult studies, our data shows no independent or synergistic association between obesity, asthma and CRP suggesting that CVD risk reduction efforts in high-risk adolescents should continue to focus on obesity.

96 House Officer

8:45 AM

Parental Perceptions and Attitudes toward Obesity in a Latino Community

Caryn Kerman, Timi Chu, John Rausch, Mary McCord.
Department of Pediatrics, Columbia University, New York, NY.

BACKGROUND: Latino children comprise a group that is at high risk for becoming overweight. Few studies have looked at the ability of Latinos, particularly Dominicans, to use pictorial images as a tool to examine their views on health in relation to weight. It is important to understand the factors that affect these views in order to develop effective strategies to combat the obesity epidemic.
OBJECTIVE: To examine the beliefs of Latino parents about the ideal for healthy body sizes for both themselves and their children and the factors that affect these ideals.
DESIGN/METHODS: 231 parents at an urban community health center associated with an academic medical center were shown Stunkard's 9 body image silhouettes of adults and Millard's 7 gender-specific body image silhouettes of children and asked to select the image that was the most healthy in all cases. Demographic information and self-reported height and weight were also collected. Multiple logistic regression models were created to determine factors significantly associated with parents' choice of the healthiest silhouette for themselves as well as their children.
RESULTS: Participants were mostly Latino (93%) from the Dominican Republic (52.8%) and primarily Spanish speakers (59.7%). Based on reported height and weight, 1.5% were underweight, 41.9% were normal weight, 33.3% were overweight, and 23.2% were obese. For each year parents spent in the US, they had an 8% increased odds of choosing an overweight silhouette as most healthy for themselves (95% CI 1.01-1.15). Parents who perceived themselves as normal weight or underweight were 12.8 times more likely to choose an overweight silhouette as healthy (95% CI 1.5-108.3). Divorced individuals were more likely to select a normal weight silhouette as the healthiest for their sons. Other factors including age, race, education level, insurance, primary language, and height did not affect how parents viewed health in relation to weight.
CONCLUSIONS: Parents' level of acculturation appears to affect what they consider a healthy weight. Thus, when providing counseling to Latino parents, it is important to determine their level of acculturation, to investigate the factors that they believe contribute to a healthy lifestyle, and to ascertain whether issues exist that may preclude them from implementing healthful changes.

97

9:00 AM

The Relationship between Physical Activity and Depression among US Adolescents in a National Sample

John Rausch.
Division of General Pediatrics, Columbia Univedrsity, New York, NY.

BACKGROUND: Depression is a significant problem in adolescence. There is growing evidence in adults that increased physical activity leads to improved mental health. Obesity is also increasingly being recognized for its association with lowered self esteem and a variety of psychiatric disorders. The relationship between activity level, obesity and depression needs to be more fully investigated in diverse groups of adolescents.
OBJECTIVE: To investigate the relationship between self reported physical activity levels in US adolescents and subsequent levels of depressive symptoms in adolescence and young adulthood and to examine whether this effect is independent of BMI category.
DESIGN/METHODS: This study is a secondary data analysis of the public access data set of Add Health, a longitudinal study of a nationally representative sample of US adolescents aged 11-21 (n= 6,504 cases). The association between self reported physical activity and depression was investigated using regression models. After univariate analyses were completed, BMI categories were added to the model. Finally, multivariate regression models were constructed to account for the important potential effect modifier of gender on both activity level and BMI categories as well as the important confounders age, race, household income, grade in school, rural vs. urban setting, and health status.
RESULTS: Self-reported activity levels were inversely associated with depressive symptoms in univariate analysis in both adolescence and young adulthood (p <.0001). BMI and gender had no significant effect on the association between activity level and depression. Activity levels were no longer significantly associated with depressive symptoms after controlling for important confounders. A relationship also existed between obesity and depression (p=.006) and gender was an effect modifier of this association (p=.006). The association between obesity and depressive symptoms was positive in females as opposed to males where there was an inverse relationship. Other factors that remained significant in our final model for depressive symptoms in young adulthood were age, race, sex, grade in school, and general health (p < .001).
CONCLUSIONS: Activity levels were not significantly associated with depression symptoms in this study after controlling for confounders. Obesity was independently associated with depressive symptoms and modified by gender. Future studies need to clarify these associations and should use more objective measures of activity level.

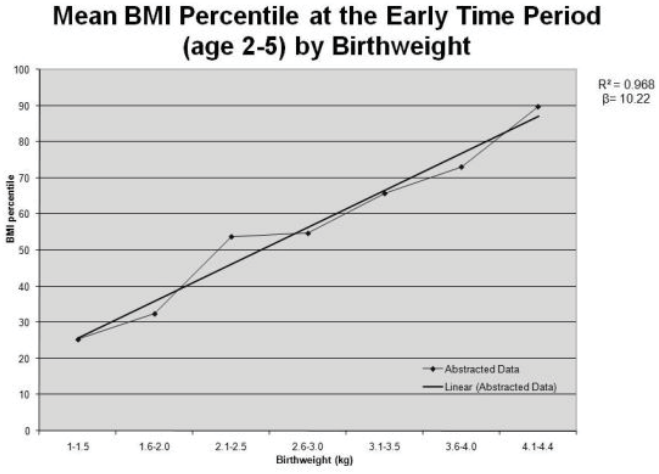
98 Medical Student

9:15 AM

Accuracy of Parental Recall of Birthweight and Associations between Birthweight and Subsequent Body Mass Index in Minority, Inner City Children

Carolyn H. Marcus, Maida P. Galvez, Susan L. Teitelbaum, Mary S. Wolff.
Mount Sinai School of Medicine, New York, NY; Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Pediatrics, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Parental recall of birthweight is often used in epidemiological studies. Moreover, the association between birthweight and subsequent body mass index (BMI) in children varies among studies. Yet, little is known about (1) accuracy of parental recall of birthweight and (2) associations between birthweight and BMI in minority, inner city children.
OBJECTIVE: This study investigated accuracy of parental recall of birthweight in "Growing Up Healthy," a longitudinal cohort of NYC boys and girls 6 to 8 years. Associations between birthweight and subsequent BMI percentile at two periods in childhood were also assessed.
DESIGN/METHODS: Recalled birthweights from the Growing Up Healthy Study baseline questionnaires were compared to Labor and Delivery records (n=70). Additional birthweight, gestational age, height and weight data were collected by chart review. For each individual with birthweight data available, two age and gender-specific BMI percentiles were calculated: an early period, between the ages of 2 and 5 (n=103), and a later period, between the ages of 6.5 and 9.5 (n=168). BMI percentiles were calculated using CDC national data.
RESULTS: There was a high degree of agreement between recalled birthweights and chart birthweights (mean difference = 0.11 kg, r-squared = 0.92). There was a strong positive association between birthweight and BMI percentile at the early time period (r-squared=0.97, β=10.22) as well as at the later time period (r-squared=0.77, β=5.07).



CONCLUSIONS: The recall of birthweights for inner city, minority children in Growing Up Healthy is highly accurate and suggests suitability of birthweight recall data in epidemiological studies. Furthermore, there is evidence that birthweight has predictive value for future BMI percentile at two periods in childhood. This has important implications given the role of childhood BMI in early onset of puberty and future disease risk, such as diabetes.

99 Fellow in Training

9:30 AM

The Effect of School Physical Activity on Students' Leisure Activity in a Predominantly Urban Latino Community

Dana Sirota, Evelyn Jenkins-Berger, Raquel Andres Martinez.
Division of General Pediatrics, Columbia University, New York, NY.

BACKGROUND: Over the last thirty years, the percentage of children who are considered overweight or obese has doubled from 15% to 30%. Latino youth are particularly affected. School-based programs can reach large populations of at-risk children however, their effectiveness is mixed. Healthy Schools Healthy Families (HSHF) is a physical activity and nutrition program for elementary school students in a predominantly minority community in Northern Manhattan. The physical activity component includes Transition Exercises (TE), short 15-20 second teacher led classroom-based exercises, and General Physical Activities (GPA), which consist of recess and gym

time. Interventions similar to TE have been shown to significantly increase the amount of student physical activity by addressing barriers such as lack of time and physical space. Nonetheless, few TE interventions have shown an effect on physical activity performed outside of school (leisure activity), which may be a useful indicator for the sustainability of healthy lifestyles in children.
OBJECTIVE: To assess the effect of TE or GPA on leisure activity for students in the HSHF program.
DESIGN/METHODS: Fourth graders (N= 316) participating in HSHF were surveyed about their leisure activity at the start and end of the 2008 school year. The total number of TE and GPA minutes performed at school was separately recorded throughout the year. A McNemar test determined changes in leisure activity and paired t-tests assessed the effect of the amount of TE or GPA on leisure activity at the end of the year. Multivariable analysis assessed school effects.
RESULTS: Students were predominantly Latino (62%). Half were male and the mean age was 9.0 (±0.56 SD) years. Students reported an increase in leisure activity from the start to the end of the school year (35.8% vs. 41.1%; p<0.05). Additionally, students who spent greater time doing TE (> 20 min/wk) showed a significant improvement in their reported leisure activity (t=1.99, p<0.05). There was no significant change for the group with less TE time (<20 min/wk). No significant association existed between GPA and leisure activity. On multivariable analysis, a school effect was noted.
CONCLUSIONS: For students participating in HSHF, TE, but not GPA was significantly associated with an increase in leisure time activity, however, this may have been influenced by school assignment. Further studies should explore the effect of TE on leisure activity.

100

House Officer

9:45 AM

Baseline Readiness of Morbidly Obese Inner-City Adolescents To Change Diet and Activity Behaviors

Eleanor Bathory, Jessica Rieder, Arthur E. Blank.

Department of Family & Social Medicine, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY; Department of Pediatrics, Division of Adolescent Medicine, Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Attendance at a weight loss program predicts weight loss in adults and children. However, retention of morbidly obese adolescents long enough to achieve and sustain meaningful weight loss remains elusive. Understanding baseline readiness to change lifestyle behaviors may help improve design of teen weight loss programs to promote long-term success.
OBJECTIVE: To study readiness to change diet and activity behaviors in morbidly obese, inner-city adolescents presenting to a weight loss program.
DESIGN/METHODS: We recruited obese (BMI >95th % for age and sex) adolescents (aged 12-21 years) at their initial visit to an inner-city children's hospital weight loss clinic. Subjects were offered an individual session with a social worker to assess readiness to change diet and activity behaviors. Session notes were reviewed and assigned a stage of change using the Transtheoretical Model. Stages of change were defined as 1) Precontemplation-no interest in change or no awareness that being obese was a health risk; 2) Contemplation-ambivalent about change but able to assess barriers and benefits; 3) Preparation-preparing for specific sustained changes; or 4) Action-sustained changes in diet and activity >1 week. Of 49 subjects enrolled 55% were Hispanic, 33% black, and 65% girls. Mean age was 14.8 ±1.9 yrs (12-18 yrs), baseline mean BMI 41.8 ±8.5.
RESULTS: Of the 37 subjects who attended the individual session 35% were in precontemplation, 49% in contemplation, 5% in preparation, and 11% in action. Comparing subjects in contemplation vs. precontemplation, a significantly higher proportion of older adolescents (15-18 yrs) were in contemplation compared to younger adolescents (12-14 yrs) (75% vs. 19% and 29% vs. 48%, respectively, $\chi 2$, p=0.02). There were no significant sex differences in readiness to change.
CONCLUSIONS: Although these morbidly obese, inner-city youth joined a weight loss program, the majority (84%) entered with either no awareness that being obese was a health risk, or ambivalence towards or no interest in changing their diet and activity behavior. Older adolescents were significantly more likely to be contemplating change than younger adolescents. Sex did not influence readiness to change. These findings suggest that weight loss programs for morbidly obese adolescents should be age-appropriate: facilitating movement from precontemplation to contemplation for younger adolescents and contemplation to preparation for older adolescents.

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10:00 AM

Fellow in Training

New Anthropometric Indices for Predicting Risk for Insulin Resistance

M. George, O. Galescu, A. Bhangoo, S. Bhandari, K. Pavlovich, M. Rosenbaum, D. DeSantis, L. Altshuler, B. Lowell, S. Shelov, R. Rapaport, W. Rosenfeld, P. Speiser, S. Accacha, S. Ten , R. Karp.

Reduce Obesity abd Diabetes (ROAD) Project, AMDeC, NY, NY; Pediatrics, SUNY Downstate Medical Center, Brooklyn, NY.

BACKGROUND: Height (Ht) and weight (Wt) are routine anthropometric measures obtained at every well child visit. Waist circumference (WC) however is not routinely measured.
OBJECTIVE: Device anthropometric indices that can accurately predict the at risk population for insulin resistance (IR) among healthy children.
DESIGN/METHODS: 162 children (aged 11-15) were studied as a part of the ROAD (Reduce Obesity and Diabetes) study. Measurements of height, weight, WC, and body fat %, systolic & diastolic blood pressures were obtained. Fasting glucose, Insulin and a 5 min IVGTT was performed. HOMA and QUICKI were calculated. The first index tested was Wt SDS - Ht SDS. The data was divided into 2 groups; Wt SDS >Ht SDS & Wt SDS < Ht SDS. In Index 2 a correction factor (CF) based on WC SDS was added into equation as follows (Wt SDS X WC CF) – Ht SDS.
RESULTS: Using Index 1 there was a significant (P< 0.05) difference in Wt, BMI, WC, Body Fat %, QUICKI and HOMA between the 2 groups. There is also a significant correlation between Index 1 & WC, Body Fat %, fasting insulin and HOMA (Table 1). Using Index 2, there was a increased significant difference and correlation in Wt, BMI, Body Fat%, fasting insulin, QUICKI & HOMA.

Index 1 (Wt SDS - Ht SDS) and it's measures:

Index 1	Wt SDS< Ht SDS	Wt SDS > Ht SDS	Correlation
Wt SDS	-0.1±0.9'	1.1±1'	
BMI SDS	-0.35±0.8*	1.33±0.7*	r=0.8'
WC SDS	-0.02±0.6'	1.3±1.1'	r=0.46'
Body Fat %	20.2±7.3'	29.2±7.7'	r=0.53'
HOMA	1.8±1.5^	2.4±1.7^	r=0.25*
QUICKI	0.35±0.02*	0.33±0.02*	r=0.20^

'P <0.0001 * P <0.01 ^ P <0.05

Index 2 and the correlations noted with each factor:

BMI SDS	WC SDS	Body Fat %	Insulin 0	HOMA	QUICKI
r= 0.9 '	r= 0.66 '	r= 0.61 '	r= 0.21 *	r= 0.3 *	r= 0.22 *

'P< 0.0001 *P<0.01

CONCLUSIONS: Using Index 1 if the Wt SDS of a child is less than the Ht SDS, the patient can be reasonably reassured to continue a healthy lifestyle. If the Wt SDS is greater than the Ht SDS the patient should be warned about their higher risk for insulin resistance and metabolic complications. When the WC was added to the equation as in Index 2, the strength of this observation was made even stronger. Both indices had a high correlation with body fat % which is a precursor to IR.

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Fellow in Training

10:15 AM

Fasting Serum IGFBP-1 with Fasting Serum Insulin Is a More Sensitive Marker of Insulin Resistance and Hypertriglyceridemia in Children

Rishi Gupta, S. Accacha, L. Altshuler, A. Bhangoo, C. Boucher-Berry, B. Broschart, D.E. Carey, M. Chickajajur, M. Chatterjee, D. DeSantis, I. Fennoy, L. Font, A. Hassoun, L. Iazzetti, F. Jacques , A. Jean, A. Koltun, B. Lowell, K. Pavlovich, R. Rapaport, M. Rosenbaum, W. Rosenfeld, E. Shamoon, S. Shelov, P.W. Speiser, S. Ten.

Reduce Obesity and Diabetes Program (AMDeC), New York, NY; Depts. Pediatr. @ Columbia Univ. Med. Ctr., New York, NY; Maimonides Med. Ctr., New York, NY; Mt. Sinai Med. Ctr., New York, NY; Schneider Child. Hosp., New Hyde Park, NY; Winthrop Hosp., Mineola, NY.

BACKGROUND: Insulin-like growth factor binding protein-1 (IGFBP-1) may be an early marker of diabetes risk.
OBJECTIVE: We hypothesized that an index defined as QUICKI x $\log_{10}${IBFBP-1] (QUICKI = 1/($\log_{10}$[fasting glucose}x{fasting insulin]) would be a better correlate of adiposity-related co-morbidity risk factors than either IGFBP-1 or QUICKI alone. This index was defined as QUICKI x $\log_{10}$[IGFBP-1].
DESIGN/METHODS: We analyzed anthropometric (BMI, % fat, and waist circumference) and biochemical [lipids, inflammatory cytokines (TNF-α, IL-6, CRP), glucose, and adiponectin] from 36 school children 11-13 yrs of age as a part of ROAD consortium. Insulin secretory capacity was measured as acute insulin response (AIR, mean rise in insulin 3 and 5 minutes after 25 gm of i.v. dextrose) and glucose disposal index [GDI, $\log_{10}$(AIR x [fasting glucose] /[fasting insulin])].
RESULTS: The IGFBP1 index was better correlated with multiple clinical (BMI, % fat, waist) and biochemical (fasting insulin, triglycerides, and adiponectin) indices of adiposity-related co-morbidity risk than either the QUICKI or IGFBP-1 (**Table 1**).
CONCLUSIONS: An IGFBP-1 index is better correlated with multiple adiposity-related co-morbidity risk factors than QUICKI or IGFBP-1 alone. This is particularly true for phenotypes associated with the metabolic syndrome (waist circumference triglycerides and HDL cholesterol).

Fig 1. Correlations of IGFBP1, QUICKI, and IGFBP1 index with risk factors.

	IGFBP1		QUICKI		IGFBP1 index	
	R	p	R	p	R	p
BMI	- 0.52	0.00	-0.64	<0.001	- 0.73	<0.001
Fat %	- 0.47	0.00	-0.62	<0.001	- 0.71	<0.001
Waist*	- 0.45	0.00	-0.63	<0.001	- 0.65	<0.001
Glucose*	0.03	ns	-0.26	ns	0.20	ns
Insulin@0min	- 0.52	0.00	-0.83	<0.001	-0.76	<0.001
Insulin@5min	-0.31	0.07	-0.52	0.0013	-0.47	<0.001
Glucose Disposal Index (GDI)	0.15	ns	0.06	ns	0.24	ns
Acute Insulin Response (AIR)	-0.26	Ns	-0.45	0.006	-0.41	0.016
cholesterol	-0.14	ns	-0.36	0.031	-0.26	ns
TG*	- 0.25	ns	0.35	0.03	- 0.45	0.006
HDL*	0.28	ns	0.43	0.008	0.41	0.01
LDL	-0.20	ns	-0.40	0.015	-0.32	0.062
TNF-α	0.11	ns	-0.21	ns	-0.15	ns
IL-6	-0.10	ns	-0.31	ns	-0.27	ns
CRP	-0.20	ns	-0.29	ns	-0.30	0.08
Adiponectin	0.29	ns	-0.42	0.01	0.45	0.005

*biochemical parameters associated with the metabolic syndrome

Plenary II
Plenary Session

Saturday, March 27, 2010
1:10 PM-4:00 PM

103
2:00 PM

Clinical Prediction Modeling To Stratify ROP Risk Using Postnatal Weight Gain

Gil Binenbaum, Gui-shuang Ying, Graham E. Quinn, Karen Karp, Robin S. Roberts, Haresh Kirpalani, The PINT Study Group.
Ophthalmology, Children's Hospital of Philadelphia, Philadelphia, PA; Ophthalmology, Scheie Eye Institute, University of Pennsylvania, Philadelphia, PA; Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, ON, Canada; Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Current ROP screening criteria in the US, UK, and Canada have poor specificity, with <10% of the infants identified for eye exams requiring treatment. Both low serum IGF-1 levels and slow postnatal growth (as a surrogate for IGF-1) are associated with subsequent ROP.

OBJECTIVE: Develop and assess a clinical prediction model that uses postnatal weight gain to identify infants at risk of developing severe ROP.

DESIGN/METHODS: Secondary analysis of prospective data from the Premature Infants in Need of Transfusion (PINT) Study, which enrolled 451 infants weighing <1000 gm at birth. After excluding deaths prior to assessed ROP status, 369 infants were analyzed. Multivariate logistic regression was used to predict development of severe ROP (stage 3 or laser surgery), by using gestational age (GA), birth weight (BW) and weight gain rate (WGR) per day calculated from weekly weights.

RESULTS: 67 (18.2%) infants had severe ROP. Median GA was 26 wks (range 22-34); median BW was 800 gm (range 445-995). The relative risk of severe ROP for every 10 gm decrease in WGR was 1.15 (95% CI 1.06-1.24). A multivariate logistic model was run on a weekly basis, to detect an alarm indicating a need for eye exams. An alarm was triggered when the predicted probability of severe ROP was >0.085. This model identified 66 of 67 infants with severe ROP, with a sensitivity of 99% (95% CI 94%-100%), specificity 36% (32%-41%), positive predictive value 26% (22%-30%), and negative predictive value 99% (96%-100%). The median time between alarm and severe ROP diagnosis was 10.8 wks (range 1.9–17.6). All 33 lasered infants were correctly identified.

CONCLUSIONS: A predictive model using BW, GA, and WGR reduced the number of infants with BW <1000 gm who require eye exams by 30%, missed 1 infant with severe ROP, and identified all infants requiring laser surgery in a high-risk cohort. Fitting the model to a broader sample that is representative of current screening guidelines and inclusive of larger BW, lower-risk infants is expected to further reduce exams and improve prediction.

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2:15 PM

Determinants of the Interpersonal Variation in Treatment Response to Anti-HIV Nucleoside Analogs

Elijah Paintsil, Ginger Dutschman, Rong Hu, Yung-Chi Cheng.
Pediatrics, Yale University, New Haven, CT; Pharmacology, Yale University, New Haven, CT.

BACKGROUND: The response to highly active antiretroviral therapy (HAART) varies among patients; HIV-infected children are disproportionately affected by the untoward effects of HAART. Nucleoside analog reverse transcriptase inhibitors (NRTIs) are the backbone of HAART. NRTIs are phosphorylated in a step-wise fashion to their active metabolites (triphosphates) by cellular kinases. We hypothesized that the individual differences in treatment response may be due to the differences in intracellular accumulation of NRTI-triphosphates.

OBJECTIVE: To investigate individual differences and determinants of intracellular accumulation of NRTI metabolites.

DESIGN/METHODS: Peripheral blood mononuclear cells (PBMCs) from 40 (20 females and 20 males, 16 years and above) healthy HIV-seronegative volunteers were incubated with radiolabelled analogs (4'-Ed4T, AZT, or 3TC) for 24 hours. HPLC was used to analyze the intracellular metabolites. Standard enzyme assays and Western blotting assays were used for evaluation of enzyme activities (e.g., thymidine kinase [TK-1], and deoxycytidine kinase [dCK]) and protein expression levels (e.g., TK-1, dCK, thymidylate kinase [TMPK], and cytidine monophosphate kinase [CMPK]). The TK-1 and dCK genes of selected individuals were sequenced to determine any polymorphisms. A two sided Wilcoxon 2-sample test was used to compare intracellular concentrations between males and females, and black and non-black.

RESULTS: Intracellular concentration of the metabolites of all the analogs varied among individuals (coefficient of variation was 60% to 270%). Though AZT and 4'-Ed4T are metabolized by similar enzymes, we observed intrapersonal differences in their metabolites. We found no significant differences in the metabolites with regard to gender and ethnicity. However, the correlation of the metabolites of thymidine analogs (AZT and 4'-Ed4T) was significant in non-black ($p< 0.01$) but not in black volunteers. There was no interpersonal association among kinase enzyme activity, expression and formation of metabolites.

CONCLUSIONS: The interpersonal variation in treatment response may be due to individual differences in the intracellular accumulation of active metabolites. The genotype and phenotype of phosphorylation enzymes could be key determinants of the observed variation. These findings have implication for individualized nucleoside analog regimen in HIV and cancer to avoid therapy-related adverse events and treatment failure.

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2:30 PM

NJ Seeds Hospital Day: Impact of a Hospital-Based Program on Student Career Choice

Scott Vergano, Ben H. Lee.
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BACKGROUND: Minority groups are underrepresented among physicians in the United States. Programs to stimulate interest in careers in medicine among underrepresented students have typically been expensive, difficult to implement, and poorly evaluated by controlled studies.

OBJECTIVE: To evaluate the association of a one-day hospital-based enrichment program with stated plans for a medical career among academically motivated eighth-grade students from economically disadvantaged backgrounds.

DESIGN/METHODS: This retrospective cohort study involved students identified by New Jersey Scholars, Educators, Excellence, Dedication, Success (NJ SEEDS), a community-based organization that recruits students from economically disadvantaged backgrounds to study in an academic enrichment program at four sites throughout the state during their eighth-grade year. Currently, all students are offered the opportunity to participate in NJ SEEDS Hospital Day, an interactive, experiential one-day hospital visit involving shadowing physicians and discussions on career pathways in medicine. During the implementation phase, from 2001-2008, some sites participated in a Hospital Day program while other sites did not. In fall 2008, alumni of all NJ SEEDS sites were surveyed regarding their educational and career plans. Data were collected anonymously and summarized as appropriate. Multiple logistic regression was used to identify student characteristics associated with a stated career goal in medicine.

RESULTS: Thirty-nine of 169 students (23%) at sites that participated in Hospital Day stated that they plan to pursue a medical degree, compared with 42 of 279 students (15%) who were not offered a Hospital Day experience ($p=0.03$). Adjusting for gender, race, year of participation, type of high school, and tutoring by a Hospital Day physician, factors that significantly increased the likelihood of pursuing a medical career were Hospital Day participation (OR 2.0, 1.2-3.4) and Asian ethnicity (OR 2.2, 1.1-4.2).

	Adjusted OR	95% CI
Hospital Day Participation	2.0	1.2-3.4
Female v Male	1.5	0.9-2.6
MD Tutor	0.8	0.4-1.5
Public school	2.2	1.0-4.9
Asian	2.2	1.1-4.2
Caucasian	0.5	0.2-1.2
African-American	1.0	0.6-1.7
Latino	0.9	0.5-1.5

CONCLUSIONS: An experiential, hospital-based one-day program had significant effects in changing career plans among economically disadvantaged, academically motivated eighth-grade students, even when surveyed up to eight years after participation.

106 Fellow in Training
3:00 PM

Impact of Language Exposure in the NICU on the Development of Vocalizations in Preterm Infants

Melinda Caskey, Betty Vohr, Bonnie Stephens, Richard Tucker.
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BACKGROUND: Human fetuses have the ability to hear as early as 23 weeks gestation and in utero are exposed to their mother's voice as the most consistent and prominent sensory input. PT infants are at ↑ risk of speech and language delay, and yet little is known about the impact of early language exposure in preterm infants on the development of early vocalizations.

OBJECTIVE: (a) to describe the sound environment of PT infants cared for in the NICU including adult hourly word counts, infant vocalizations and conversational turns, percentage of time infants are exposed to language, monitor noise, other noise and silence; (b) to test the hypothesis that infants who are exposed to more adult language will have more vocalizations.

DESIGN/METHODS: Prospective cohort study. Infants ≤1250 grams b wt., who were medically stable and not intubated were enrolled. Mean Bwt was 920g ± 201 and gestation was 27 wks. 16 recordings were made in the NICU using a digital language processor inserted into a vest worn by the infant at 32w and 36w post-menstrual age.

RESULTS: A total of 32 infants were recorded at both 32w (±2) and 36w (±2). Both adult word counts per hour (196 ± 571 vs 510 ± 879) and infant vocalizations/hr (6 ± 11 vs 10 ± 15) ↑ significantly between 32 and 36 weeks ($p<0.001$). Infant exposure to adult language as % of total time ↑ significantly from 32w (2.1%) to 36w (5.1%). Monitor noise ↑ from 26.6% to 37.8%, silence ↓ from 36% to 27.3%, and other noise ↓ 35.4% to 29.6% from 32w to 36w. For every ↑ 100 adult words infants were exposed to they ↑ their total vocalizations by 6%. ($p<0.0001$). When a parent was present infants vocalized significantly more than when a parent was not present (13.3 vs 7.7 vocalizations per hour, $p=0.0003$), and had significantly more conversational turns per hour (6.1 vs 1.5, $p=<0.0001$).

CONCLUSIONS: PT infants begin to make vocalizations prior to their projected due date and significantly ↑ their number of vocalizations between 32 and 36 weeks gestation. Although infant exposure to language ↑ over time, adult language accounted for only a small percent of the sounds to which an infant is exposed in the NICU. Exposure to parental language was a significantly stronger predictor of infant vocalizations and conversational turns than other adult language. These findings support the powerful effects of parent visiting in the NICU on the emergence of early vocalizations among VLBW infants.

107 Fellow in Training

3:15 PM

Sinus Node Dysfunction in Long QT Syndrome: Involvement of HCN Pacemaker Current

Pooja D. Kulkarni, Yelena Kryukova, Richard B. Robinson.

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BACKGROUND: Sinus node dyfunction is observed in Long QT sndrome. MinK-related peptide 1 (MiRP1) mutations are associated with long QT syndrome 6 (LQTS6). MiRP1 interacts with the hyperpolarization-activated, cyclic nucleotide gated (HCN) family (molecular correlate of pacemaker channel), serving as a β subunit that can alter channel amplitude and kinetics but not voltage dependence, although the effect may vary with HCN isoform and species. High levels of MiRP1 and HCN subunits are expressed in the cardiac sinoatrial node, where the pacemaker channel contributes to impulse initiation. Human MiRP1 (hMiRP1) mutants associated with LQTS6 may differ from wild type hMiRP1 (WThMiRP1) in terms of interaction with or functional impact on human HCN (hHCN) subunits. This difference could provide a physiological basis for sinus node dysfunction in LQTS6.

OBJECTIVE: We hypothesized that mutant hMiRPs affect function (kinetics, voltage and /or amplitude) of hHCN2 differently than WThMiRP1. We used site-directed mutagenesis to create 2 specific LQTS6 mutations: T8A and M54T.

DESIGN/METHODS: Transient transfection of neonatal rat myocyte cultures was done using shuttle vectors PDC515hHCN2 alone or in combination with either PcNeoWThMiRP1, PcNeoT8AhMiRP1or PcNeoM54ThMiRP1. Expressed HCN2 current was recorded using a patch electrode in whole cell mode on myocytes. An Axopatch-200B amplifier and pClamp9 software (Axon Instruments) were used for acquisition and analysis of kinetics, amplitude and voltage dependence.

RESULTS: Co-expression of T8AhMiRP1, but not M54ThMiRP1, with hHCN2 decreased amplitude (pA) of hHCN2 current compared with other conditions: (Mean±SEM) 1851±357, 2086±194, 1768±256, 617.5±85 for hHCN2 alone, with WThMiRP1, with M54ThMiRP1 and with T8AhMiRP1 respectively (n=6-9, $p<0.05$ for T8AhMiRP1 by ANOVA). Kinetics of HCN2 activation was defined by fitting the fast component of the trace with a single exponential fit. Both T8AhMiRP1 and M54ThMiRP1 had slower activation kinetics than hHCN2 alone or with WThMiRP1 by ANOVA; $p<0.001$. No effect on voltage dependence was demonstrated as previously reported.

CONCLUSIONS: The combination of a decrease in current amplitude and slower activation kinetics of hHCN2 co-expressed with mutant T8AhMiRP1 would be expected to result in less depolarizing current early in cardiac diastole. This may provide a physiological explanation for sinus node dysfunction in long QT syndrome 6 and a basis for further pharmacologic interventions.

108 Fellow in Training

3:30 PM

Impact of Delivery Room (DR) Resuscitation on Outcomes of Very Low Birth Weight (VLBW) Infants: Results from the Caffeine for Apnea of Prematurity (CAP) Trial

Sara B. DeMauro, Robin S. Roberts, Peter Davis, Ruben Alvaro, Aida Bairam, Barbara Schmidt, The CAP Trial Investigators.

Children's Hospital of Philadelphia and University of Pennsylvania, Philadelphia, PA; McMaster University, Hamilton, Canada; University of Melbourne, Melbourne, Australia; University of Manitoba, Winnipeg, Canada; Université Laval, Québec, Canada.

BACKGROUND: The impact of different levels of DR resuscitation on clinically important short and long-term outcomes of VLBW infants is uncertain.

OBJECTIVE: We used data from the international CAP trial to examine the relationships between levels of DR resuscitation and outcomes up to 18 months.

DESIGN/METHODS: All levels of DR resuscitation were recorded in CAP trial participants. We divided infants into 4 groups of increasing intensity of resuscitation: minimal (including supplemental oxygen and CPAP), n=343; bag-mask ventilation, n=372; endotracheal intubation (ETT), n=1205; and CPR (chest compressions/epinephrine), n=86. We used multivariable logistic regression models to compare CAP trial outcomes over the 4 groups, adjusted for gender, GA, antenatal steroids, SGA, multiple birth, caffeine, and maternal education.

RESULTS: Both the observed and adjusted rates of BPD and severe ROP were significantly higher in the ETT and CPR groups than in the other 2 groups. Observed rates of NEC and brain injury increased with higher levels of resuscitation, but adjustment for important prognostic factors reduced the differences between the groups (table 1). Observed rates of death or disability, CP, and MDI<85 (BSID-II) increased with level of resuscitation, but adjusted rates were similar in the 4 groups (table 2).

Table 1

			Short-Term Outcome Rates (%)			
Outcome	Analysis	P (trend)	Minimal	Bag/Mask	ETT	CPR
BPD	Observed	<0.001	28.6	29.1	49.2	43.6
	Adjusted	<0.001	34.8	32.9	46.1	40.6
Brain Injury	Observed	0.001	10.6	8.2	15.8	17.9
	Adjusted	0.43	13.9	10.2	14.3	15.8
Severe ROP	Observed	<0.001	1.5	2.5	8.7	12.8
	Adjusted	0.02	3.4	4.7	6.9	9.2
NEC	Observed	0.06	5.8	4.6	6.8	12.8
	Adjusted	0.31	6.6	5.0	6.4	12.3

Table 2

			18 Month Outcome Rates (%)			
Outcome	Analysis	P (trend)	Minimal	Bag/Mask	ETT	CPR
Death/Disability	Observed	<0.001	38.1	36.9	45.9	53.2
	Adjusted	0.13	41.3	40.4	44.1	50.9
CP	Observed	0.01	3.6	4.6	6.7	8.7
	Adjusted	0.20	4.4	5.4	6.1	8.6
MDI<85	Observed	0.05	33.4	31.6	38.0	39.4
	Adjusted	0.47	35.6	33.4	36.7	39.5

CONCLUSIONS: VLBW infants who received delivery room CPR and survived to a corrected age of 18 months did not have an increased risk of disability.

109 Fellow in Training

3:45 PM

Norepinephrine Induced Ovine Mesenteric Artery Constriction Peaks in Late Preterm Gestation: Implications in Pathogenesis of Necrotizing Enterocolitis

Jayasree Nair, Bobby Mathew, Melissa Carmen, James A. Russell, Satyan Lakshminrusimha.

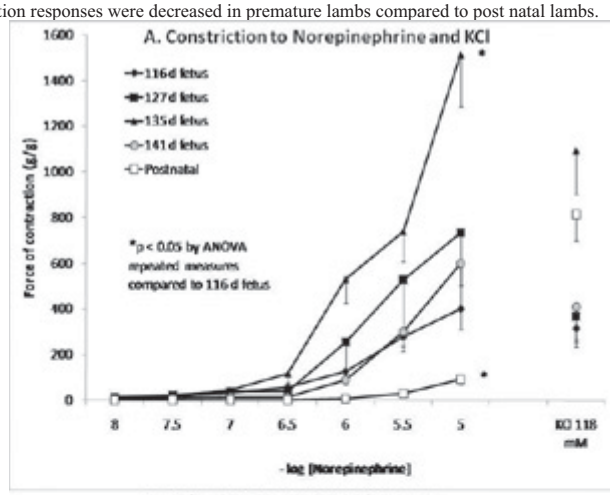
Neonatology, Women and Childrens Hospital, Buffalo, NY; Physiology, University of Buffalo, Buffalo, NY.

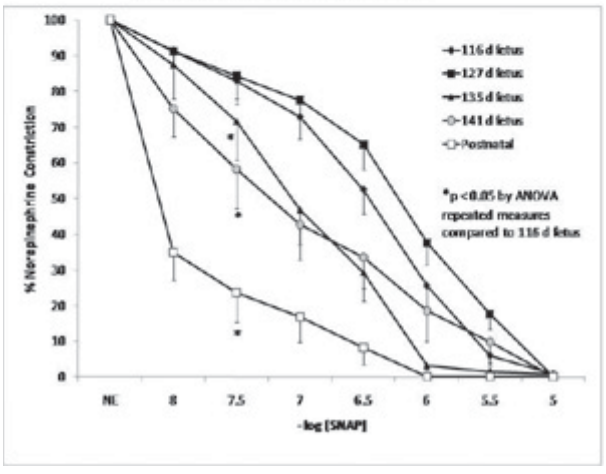
BACKGROUND: Prematurity, feeding and intestinal ischemia are major risk factors contributing to development of necrotizing enterocolitis (NEC). Mesenteric arterial vascular resistance has been shown to be predictive of development of NEC, and is maintained by a dynamic balance between constrictor and dilator stimuli. The median postmenstrual age at NEC presentation is usually 31-32wk. A developmental change in mesenteric vasoreactivity may predispose to intestinal ischemia and NEC. 135d (term 147d) in sheep corresponds to 34wk gestation in humans in maturation.

OBJECTIVE: To study the developmental changes in contractile response of ovine mesenteric arteries to norepinephrine (NE) and relaxation to nitric oxide donor S-nitroso-N-acetylpenicillamine (SNAP) with gestational age.

DESIGN/METHODS: Mesenteric arteries of preterm lambs at 116 (previable), 127 (extreme prematurity), 135 (late preterm), 141 (near term) days gestation and postnatal lambs at 7 days were dissected (3-9 lambs in each group). Tissues were pretreated with propanolol and constriction response to increasing doses of NE between 10^{-8} to 10^{-5}M and relaxation responses to nitric oxide donor SNAP (10^{-8} to 10^{-5}M) were obtained. Maximal contractile response to 118 millimol/L of KCl was obtained. Results were analysed using ANOVA for repeated measures.

RESULTS: Constriction response to NE peaked at 135d gestation. Mesenteric arteries from 135d gestation fetal lambs constricted significantly greater compared to 116d and postnatal lambs. Relaxation responses were decreased in premature lambs compared to post natal lambs.





CONCLUSIONS: The decreased constriction to NE and enhanced relaxation to SNAP seen postnatally may be indicative of mesenteric vasodilation in response to enteral feeding. In the late preterm lamb, peak constrictor response correlates with the gestational period of peak incidence of clinical NEC. These results may have implications in the pathogenesis of NEC.

Neonatology - Epidemiology & Followup Platform Session

Saturday, March 27, 2010
4:15 PM-5:45 PM

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4:15 PM

The Impact of Treatment Hospitals on the Disparity in Preterm Birth Experienced by African American Women

Erika F. Dennis, Corinne Fager, Scott A. Lorch.
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BACKGROUND: Attempts to fully account for the disparity in preterm birth for African American women have been ineffective. The explanatory role of treatment hospitals and maternal complications have not been well studied.

OBJECTIVE: To quantify the cumulative impact of sociodemographic factors, medical complications, and hospital level effects on the disparity in preterm birth rates experienced by African American women.

DESIGN/METHODS: Using linked birth certificate data and infant and maternal discharge summaries from all women delivering in Missouri, California, and Pennsylvania between 2001-2003 (N=1,812,938), we constructed logistic regression models to assess the degree to which sociodemographic factors, medical complications, and hospital level effects account for disparate rates of preterm birth (<37 weeks gestation). Medical complications included hypertensive disorders, diabetes, infectious diseases, placental abnormalities, premature rupture of membranes, oligohydramnios, anemia, thyroid disorders, lupus, and kidney disease.

RESULTS: In the base model controlling for state, year, and race alone, we found that African American women had the highest rates of preterm birth compared to Whites (OR 1.77, 95% CI 1.74 -1.80). In a subsequent model accounting for state, year, race, age, month prenatal care began, insurance, parity, maternal and paternal education, we found a decreased OR of 1.56 (95% CI 1.53-1.59) accounting for a 27% reduction in odds of preterm delivery. Adding major medical problems to this model reduced the odds ratio for preterm birth among African Americans by a total of 44% (OR 1.43, 95% CI 1.40-1.46). When we created a model including treatment hospital, race, and year the odds ratio declined by 40% (OR 1.46, 95% CI 1.44-1.49). In our final model controlling for all demographic parameters, medical conditions, and treatment hospital, we found the largest reduction of 66% in the odds ratio for preterm delivery among African American women (OR 1.26, 95% CI 1.23-1.29).

CONCLUSIONS: Maternal complications and treatment hospital together account for approximately 53% of the disparity in preterm birth experienced by African American women. Reducing rates of pregnancy complications and understanding the underlying reasons for hospital variation in outcomes offer potential methods to reduce this disparity.

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Fellow in Training

4:30 PM

Racial Disparities in Maternal Oral Health Experiences in 10 States, Pregnancy Risk Assessment Monitoring System, 2004-2006

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BACKGROUND: Maternal periodontal disease has been implicated as a possible risk factor for preterm birth. Among U.S. children and adults, there are significant disparities in oral health status by race and ethnicity. Population-based studies assessing the oral health experiences of women in the peripartum period are lacking.

OBJECTIVE: The aims of this study are to describe the oral health experiences of mothers during their most recent pregnancy and to assess racial and ethnic disparities in maternal oral health experiences.

DESIGN/METHODS: We analyzed 2004-06 data from the CDC Pregnancy Risk Assessment Monitoring System (PRAMS), a population-based surveillance system that collects data on pregnancy and postpartum experiences of mothers who have recently delivered a live infant. Ten states included in the analysis had a ≥70% weighted response rate and three standard questions pertaining to oral health. White non-Hispanic (WNH), Black non-Hispanic (BNH), and Hispanic women were selected for analysis. We used weighted percentages/standard errors and multivariate logistic regression, controlling for selected descriptive characteristics.

RESULTS: Among the 35,267 women studied, only 41% of all women received oral health counseling during pregnancy. In the adjusted multivariate analyses, BNH women were more likely to have a dental problem compared to WNH women (OR 1.19, CI 1.05-1.35) while there was no difference between Hispanic and WNH women (OR 0.87, CI 0.72-1.04). BNH and Hispanic women were less likely to obtain dental care during pregnancy compared to WNH women (OR 0.87, CI 0.77-0.98; OR 0.77, CI 0.64-0.91 respectively) and were also less likely to ever have had teeth cleaning (OR 0.64, CI 0.52-0.78; OR 0.36, CI 0.29-0.46 respectively). Compared to WNH women, BNH and Hispanic women were less likely to have a teeth cleaning before pregnancy (OR 0.82, CI 0.72-0.94; OR 0.60, CI 0.50-0.72 respectively) as well as during pregnancy (OR 0.68, CI 0.59-0.78; OR 0.74, CI 0.61-0.90 respectively).

CONCLUSIONS: Significant racial/ethnic disparities in maternal oral health experiences exist. Most women are not offered dental counseling during pregnancy. Given the association between poor oral health and overall health, especially in increasing the risk for cardiovascular events and possibly preterm birth, ensuring the oral health of all pregnant women should be an essential component of prenatal care.

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Fellow in Training

4:45 PM

Assessment of Language Development and Related Risk Factors in Preterm Infants

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BACKGROUND: Developmental language disorder is reported in 5-10 percent of children born at term gestation. Many congenital and acquired conditions such as degenerative neurologic disorders, infection and hemorrhagic or ischemic brain injury can be associated with language delay. Preterm infants are at greater risk of these insults resulting in motor, sensory and cognitive impairment, which in isolation or combination, can contribute to poor language development. There is limited data available on speech and language development in preterm infants.

OBJECTIVE: Evaluate language development of preterm infants using the validated Language Development Survey and Bayley III at 18-24 months corrected age and associated risk factors.

DESIGN/METHODS: 207 preterm infants (BW 1428±549 SDgm, mean GA 29.8±2.9 SDwks, range 23-34wks) had neuro-developmental assessment (Bayley III) at 6, 9, 12, 18, and 24 months corrected age (CA). A Language Development Survey (LDS) was completed by parents between 18-24 months (22.5±3SD). Infants were divided into 3 groups. Group 1 (significantly delayed; <30 words), group 2 (moderately delayed; 30-50 words), and group 3 (normal; >50 words with word combination). Comparisons were made by using ANOVA and logistic regression.

RESULTS: At 18-24 months CA, 33.3% of infants had abnormal results on LDS (22.7% in group 1, 10.6% in group 2). 36.2% of group 1 were born before 28 weeks GA as compared to 20.3% of group 3 (p=0.032). There was a significant correlation between LDS and Bayley III language (104 ± 13 SD, p<0.001) and motor (106±12SD, p=0.003) composite scores. There was a trend between LDS and Bayley III cognitive composite score (108 ±14SD, p=0.06). The majority (86%) of infants were primarily English speaking. No significant association was identified between gender, race, frequency of otitis media, maternal age, maternal education level, socioeconomic background and language development. Lower GA and BW had a negative effect on language development (p=0.029 and p=0.011). Sepsis and BPD were associated with poor language development (p= 0.042 and p=0.008) after controlling for GA and BW.

CONCLUSIONS: In our study population, one third of preterm infants had abnormal language scores at 2 years of age. Sepsis, BPD, lower GA and BW were associated with poor language development. LDS results were comparable to Bayley III speech assessment. LDS appears to be a suitable screening tool for language delay in former preterm infants.

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House Officer

5:00 PM

The Incidence of Morbidities and NICU Admissions among Early Term (37-38 6/7 Weeks) and Late Term (39-41 Weeks) Neonates at Women and Children's Hospital of Buffalo (WCHOB)

Shaon Sengupta, Alyssa Herrmann, Vivien Carrion, Rita Ryan, James Shelton, Satyan Lakshminrusimha.
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BACKGROUND: The past decade has witnessed a heightened awareness about increased risk of respiratory morbidity, feeding intolerance, and increased NICU admission among late-preterm infants born between 34 to 36 6/7 weeks gestation. We propose that, based on similar mechanisms, the early-term (gestational age 37 0/7 – 38 6/7 weeks) babies have worse outcomes than those born at gestational age 39 0/7-41 6/7 weeks.

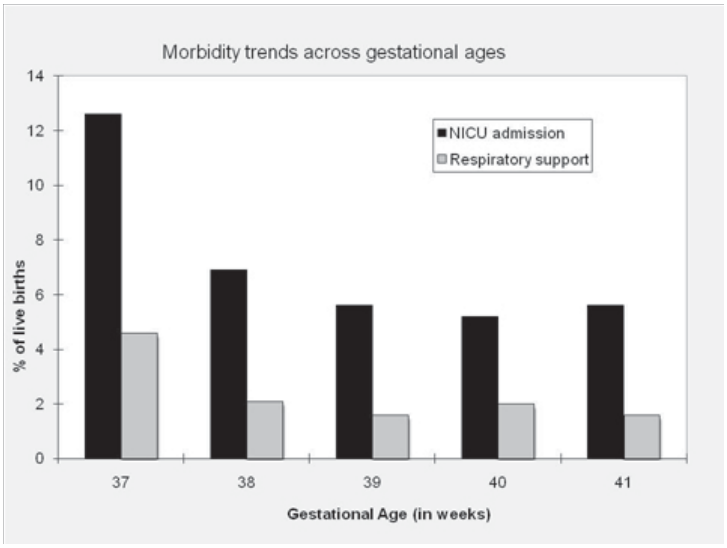
OBJECTIVE: We hypothesize that amongst all full term babies born at WCHOB between January 2006 to December 2008, neonates born between 37-38 6/7 weeks have significantly increased morbidities (NICU admission, respiratory, feeding issues, infections) as compared to neonates born at 39 0/7-41 6/7 weeks. The primary outcome was the need for NICU admission.

DESIGN/METHODS: This study is a retrospective chart review of all NICU admissions at ≥ 37 weeks gestation from 1/1/06- 12/31/08. These were divided into early-term (37-38 6/7 weeks) and late-term (39-41weeks) newborns. Exclusion criteria was major congenital malformations.

RESULTS: There were 7626 term live births during the study duration; 28% of these births were between 37-38 6/7 wks of gestation. The proportion of NICU admission, the need for respiratory support, rates of suspected sepsis and hypoglycemia were significantly higher in the early-term neonates as compared to the late-term neonates.

	Early-Term:37-38 6/7 wks [N=2148]	Late-Term:39-41 wks [N=5478]	P value
NICU admission	187 (8.7)	300 (5.5)	< 0.001
Respiratory Support	62 (2.9)	97 (1.8)	0.002
Hypoglycemia	66 (3.1)	89 (1.6)	< 0.001
Antibiotic therapy	100 (4.7)	174 (3.2)	0.002

Data shown as number (%)



CONCLUSIONS: We conclude that early-term neonates are at significant risk of morbidity. Current perinatal practices should be modified in an effort to avoid elective and semi-elective early-term births.

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House Officer

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Outcome of Preterm and Late Preterm Multiple Gestations Conceived by Assisted Reproduction

Ime Essien-Lewis, Preston Hoffman-Williamson, Toni Mancini, Emidio Sivieri, Soraya Abbasi.

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BACKGROUND: Singleton pregnancies resulting from assisted reproduction technology (ART) are reported to be at greater risk for complications as compared to those spontaneously conceived (SPONT). However, ART is associated with an increased number of multiple gestation pregnancies and data regarding the outcomes of multiple gestations from ART compared to SPONT is limited and has yielded conflicting results.

OBJECTIVE: To compare the outcome of multiple gestation pregnancies conceived through assisted reproduction technology to spontaneous conception.

DESIGN/METHODS: A retrospective analysis of multiple gestations in an inborn tertiary care center from 1998 to 2008. Maternal demographics, method of conception, antepartum, delivery complications and neonatal outcomes for pregnancies conceived through ART (N=299), intrauterine insemination (IUI; N=39), ovulation induction (OVI; N=79), or SPONT (N = 902) were compared using chi-square, analysis of variance, and logistic regression tests.

RESULTS: ART mothers were significantly older (34.0 ±5.0y vs 29.1 ±6.0y, P=0.01). ART, IUI, and OVI mothers were more likely to be Caucasian (87%, 90%, and 80% vs 44%, P=0.01). The rate of C-Section delivery was significantly higher in the ART group (73% vs 57%, P<0.001). The incidence of PPROM, clinical chorioamnionitis, choronic hypertension, preeclampsia, antenatal steroids and alcohol and tobacco use were similar. ART group had significantly lower GA and similar BW as compared to SPONT. ART infants had significantly more RDS (p=0.002) as compared to SPONT. BPD was significant higher in the OVI group (p= 0.027) as compared to the SPONT group. All other neonatal outcomes, including mortality, PDA, IVH, NEC, sepsis, duration of ventilation, and length of stay, were similar. More infants were born at term GA in SPONT than ART (12.4% vs 6.7%). The two groups had similar rate of late preterm gestation (51.5% vs 51%). Late preterm ART infants had longer duration of oxygen than SPONT (3.2±2.4d vs 2.3± 1.9d). All other outcomes were similar.

CONCLUSIONS: More spontaneously conceived multiple gestations were born at term gestation. The ART group had similar growth to those conceived spontaneously when controlled for GA. ART infants had higher incidence of RDS. Late preterm ART infants had longer need for oxygen. Further investigation is needed to determine the possible predisposition of ART infants to certain complications of preterm birth.

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Predictors of Mortality, Length of Stay and Co-Morbid Hypothermia in Hospitalized Neonates with Pneumonia in Eritrea, Africa

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BACKGROUND: Millenium Development Goal No. 4 aims to reduce neonatal mortality by 2/3 by 2015. Sub-Saharan Africa has the highest rate, and in Eritrea rates have remained constant between 1995-2002. Pneumonia is the third leading cause of neonatal death in this region.

OBJECTIVE: To determine predictors of mortality in a hospitalized cohort of infants with pneumonia in Asmara, Eritrea.

DESIGN/METHODS: Retrospective review of all 2006 admissions to the Orotta Pediatric Hospital Neonatal Intensive Care Unit, the only tertiary center in the country. Data on age, birth weight, gender, mode of delivery, Apgar score, maternal age, birth location, admission diagnosis, admission comorbidities and outcome was collected. Multivariate analysis was used to determine predictors of mortality and length of stay. Bivariate analysis was used to determine the impact of admission hypothermia (temperature <35.0 C) on outcomes. Chi-square and Fisher's Exact Test were used.

RESULTS: 1503 infants were admitted to the NICU during the study period. 306 were diagnosed with pneumonia, with an overall mortality of 13.7%. In multivariate analysis, gestational age, birthweight less than 2kgs, (p< 0.04 95%, Confidence Interval 1.0 to 16.7) and Apgar score at one minute (p< 0.01 95%, Confidence Interval 0.12 to 0.58) were predictive of mortality. Birthweight less than 2kgs was the only variable associated with increased length of stay (p<0.001 95% Confidence interval 0.48-0.98) Hypothermia was a comorbid condition in 25.8% of cases with pneumonia. There was no statistical difference in mortality rate based on presence of hypothermia (p<0.14 Chi-Square). When stratified by birthweight, the incidence of hypothermia decreased with increased birthweight. Hypothermia was seen in 50% of patients less than 2kgs. No statistical difference in mortality was seen in hypothermic patients when stratified by birthweight.

CONCLUSIONS: Gestational age, birthweight and low initial Apgar score are predictors of mortality in Eritrean neonates with pneumonia presenting to a tertiary care center. Birthweight is also associated with increased length of stay. A high incidence of co-morbid hypothermia exists in this population, particularly in infants less than 2 kgs. We speculate attention to inexpensive interventions such as kangaroo care may decrease the incidence of hypothermia, which although did not affect length of stay or mortality, is well known to increase other NICU co-morbidities.

Neonatology - Clinical Studies I Platform Session

Saturday, March 27, 2010
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Fellow in Training

4:15 PM

Validation of Visible Light Tissue Oximetry in Newborn Infants

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BACKGROUND: Invasive hemodynamic monitoring is impractical in newborns, so indices of perfusion / tissue oxygenation widely used in older patients are unavailable in neonates. Blood pressure and pulse oximetry (SPO_2) are poor indicators of tissue oxygenation; elevation of serum lactate is a late sign. Currently available tools to assess tissue oxygenation are limited. Near infrared spectroscopy (NIRS) is useful for monitoring cerebral oxygenation, but requires large surface sensors and has not been adapted for monitoring somatic perfusion. The T-Stat 303 tissue oximeter uses visible light spectroscopy (VLS) to measure oxygen content of hemoglobin at a microvascular level using small mucosal probes. VLS senses Hgb more strongly and measures a smaller sample of tissue, resulting in tighter nl range than NIRS. It continues to measure during low perfusion, hypotension, or asystole, as a pulse is not required for measurement. The device has been validated and shown to reliably detect ischemia in adults and children, but there are virtually no data in neonates.

OBJECTIVE: The aim of this study is to validate the performance of the tissue oximeter and establish approximate normative data for stable infants with normal SPO_2 and apparently normal circulation/tissue perfusion.

DESIGN/METHODS: This was an observational study involving term hemodynamically stable infants >24 h of age with no history of recent vasoactive drug use or volume expansion. Each infant was monitored with a T-Stat probe in addition to the standard monitoring of SPO_2 and blood pressure. Downloads of SPO_2 data and tissue oxygenation (StO_2) were analyzed with and without occasional periods of movement artifact. Mean StO_2 value for each infant was calculated and the mean of these values are reported.

RESULTS: 15 infants, mean gestational age 38 wk (range 36-41) and mean birth weight of 3174 g (range 2005-4810) were studied while resting quietly between feedings for periods of 1-3 hrs. The buccal probe was easy to place and was well tolerated. Mean StO_2 level was 60.7 ± 4.39%, mean SPO_2 was 99 ± 0.015%. Mean StO_2 without removing the motion artifact was 58.0 ± 5.07%. Mean heart rate was 142 ± 18. Mean BP (mean) was 52 ± 7 and mean hematocrit was 42 ± 9%.

CONCLUSIONS: The StO_2 measurements were consistent, easy to perform and yielded values similar to those observed in adults. This is the first study to report the normal value of StO_2 in stable newborn infants. Use of Tissue oximetry in NICU may improve the timely detection of hypoperfusion states in newborns.

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Fellow in Training

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Comparison of Simultaenous Cerebral Oximeter and Pulse Oximeter Data in Preterm Infants with RDS

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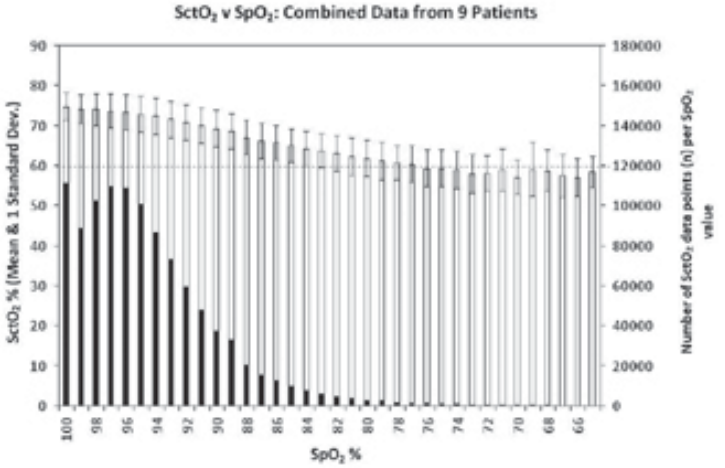
BACKGROUND: Preterm infants' ability to adequately extract and utilize oxygen remains largely unknown. These infants also have immature cerebral vascular autoregulation. Corresponding measures of NIRS brain oxygen saturation ($SctO_2$) to peripheral arterial oxygenation (SpO_2) have not been reported in this population. NIRS may provide guidance on adequacy of cerebral oxygenation in the face of peripheral hyper- and hypoxemia SpO_2 data.

OBJECTIVE: In this study, we monitored both pulse and cerebral oximetry in preterm infants with respiratory distress syndrome (RDS) and compared the measurements.

DESIGN/METHODS: After obtaining parental consent, we used a 4-wavelength NIRS device to monitor brain $SctO_2$ (FORE-SIGHT ®, CASMED, Branford, CT USA) and simultaneous SpO_2 data (Radical ®, Masimo Corp., Irvine, CA USA). Data were collected every 2 seconds for a total

of 72 hours/infant and organized by grouping the $SctO_2$ data with decremented SpO_2 values (100, 99, 98, etc).
RESULTS: Nine preterm neonates with gestational age of 29-32 weeks and weighting 980-1650 g were monitored. All subjects had RDS but had no known brain issues. 4 of 9 subjects experienced bradycardia during the study. The figure contains an aggregate of $SctO_2$ (mean and 1 SD) for each SpO_2 value for all 9 subjects combined. 24.3 days of data were recorded where SpO_2 was less than 80% for 1.1% of the total time.



CONCLUSIONS: The accepted clinical range in this population of SpO_2 is 85-95%. Assuming a $SctO_2$ range of 60-90%, some infant brains may tolerate a lower SpO_2 due to the body's compensatory mechanisms (assuming peripheral organs are not compromised). This is also supported by the SpO_2-$SctO_2$ difference, which decreases with SpO_2. It is well known that pulse oximeter accuracy falls as SaO_2 drops below 80% and worsens with vasoconstriction. NIRS can provide reassurance of adequate brain oxygenation during transient SpO_2 changes, even in the presence of severe hypotension since SpO_2 pulsations are not required for NIRS measurements.

118 Fellow in Training

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Cardio Respiratory Monitoring in the NICU: Evaluation of a Wireless Monitor

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BACKGROUND: Common in preterm infants are episodes of apnea and bradycardia. A wireless monitor could eliminate the need for skin electrodes and wires required to monitor these infants. The aim of this study was to eliminate the false alarms generated by existing technologies such as trans-thoracic impedance that reduce compliance in the home setting. Improved compliance and low costs would lower the barriers to monitor the neonatal patients in and outside of the NICU.
OBJECTIVE: To determine if the sensors used in the PGS Monitor provide equal performance to the data acquisition of reference monitors commonly utilized in the NICU. The wireless monitor combines a plethysmography transducer with a reflectance photoplethysmography design with two distinct sensors for heart and respiratory rate calculation.
DESIGN/METHODS: Studies of 31 premature infants showed the feasibility of acquiring heart rate data from the abdomen and back using the reflectance photoplethysmography (RPPG) method. Data collected from wireless monitor were compared to monitors using electrodes and wires. Subjects were NICU patients needing continuous CR monitoring. Patients were excluded if they had chest or abdominal surgery. Demographic data collected were gestational age, DOL, gender, race,diagnosis. The wireless belt was then placed around the abdomen and data was recorded from both the standard monitor and the wireless monitor.
RESULTS: Utilizing a Windaq system, data was collected on 31 infants. Using the same sample rate for both monitors provides an accurate means for comparing the data in real time. With respect to the pulse detection aspect of the monitors, the correlation between output waveforms was examined by implementing a peak detector. The raw data was imported in a CSV format. Each file was then reviewed and 5 selections of at least 3 minutes duration wherein both monitors were displaying stable waveforms were compared for parity of peaks representing a beat.Manually counting the peaks showed a 96% correspondence with deviation of +/- 2 beats discrepancy between the standard and PGS monitors.There was 95% confidence that the differences between readings were between mean +/- 2SD; indicating that if the limits of agreement are within clinically accepted errors, that the new method of indirect measurement (PGS sensor) can replace the current method.
CONCLUSIONS: A wireless, disposable cardio-respiratory monitor represents a significant improvement in an area of research that has remained unchanged in the past 20 years.

119 House Officer

5:00 PM

Is Screening for Retinopathy of Prematurity Necessary in Growth Restricted Neonates Born after 30 Weeks Gestation?

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BACKGROUND: The American Academy of Pediatrics Section on Ophthalmology, the American Academy of Ophthalmology, and the American Academy for Pediatric Ophthalmology and Strabismus recommend screening all infants with birth weight less than or equal to 1500g or gestational age less than 32 weeks for retinopathy of prematurity (ROP). Prematurity is the greatest risk factor in the development of ROP. Prolonged use of oxygen and low birth weight are additional risk factors. It is well described that in premature infants born before 30 weeks gestation, the risk of ROP is inversely proportional to birth weight. However, despite widespread use of the current recommendations, there are no data demonstrating the risk of ROP in very low birth weight infants born after 30 weeks gestation.
OBJECTIVE: To determine the incidence of ROP in neonates with birth weight less than 1500g born after 30 weeks gestation.
DESIGN/METHODS: This is a retrospective cohort study of all infants with birth weight less than 1500g and gestational age greater than 30 weeks who received ROP screening at the Mount Sinai Hospital between January 1, 2006 and December 31, 2009. Medical records from both inpatient and outpatient ophthalmologic exams were evaluated for timing, course, and severity of ROP. Neonatal hospital course was evaluated for significant illness including respiratory distress, duration and severity of respiratory support, hypotension, and sepsis.
RESULTS: Two hundred sixty-seven patients met study criteria. The medical records of one hundred thirty-two patients have been reviewed to date, and analysis of the full cohort will be presented. Of those reviewed to date, one hundred twenty-nine survived to ROP exam. Two (1.6%) developed mild ROP. Both cases resolved without intervention and with good long-term visual outcome. Both infants had hyaline membrane disease and other complications to their medical course. No neonate whose only indication for ophthalmologic screening was very low birth weight developed ROP.
CONCLUSIONS: It is not necessary to provide routine screening for ROP for infants born at gestational age greater than or equal to 30 weeks, regardless of birth weight. Birth weight alone should not be used as criteria for ophthalmologic screening in neonates. Further study is needed to determine if other risk factors besides low birth weight necessitate ROP screening in very low birth weight infants born after 30 weeks gestation.

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Quality Improvement (QI) Project To Improve Admission Temperatures in Very Low Birth Weight Infants

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BACKGROUND: Neonatal hypothermia, defined as temperature below 36 C induces cold stress in 'Very low-birth weight' infants (VLBWI, < 1500 grams) and can have serious consequences. Data from Vermont Oxford network (VON) revealed that the admission temperature rates < 36° C of VLBWI admitted to our 'Neonatal intensive care unit' (NICU) was 44.4 % compared to the network rates of 30.9 %.
OBJECTIVE: A QI project was designed to improve admission temperatures in VLBWI and to study whether admission temperature is independently associated with selected neonatal morbidities and in-hospital mortality.
DESIGN/METHODS: Multi-disciplinary team for prevention of Neonatal Hypothermia with stakeholders from nursing, obstetrics, environmental sciences and pediatrics was charged to identify and change the processes of care that contributed to the risk of hypothermia among VLBWI using PDSA (Plan-Do-Study-Act) methodology. Inborn VLBWI infants during two epochs: 12 months prior to the planning, education and implementation phase (January to December 2008) {n=116}, and interim data (until October 2009) during the implementation period (April 2009 to March 2010) {n=56} were studied. Fisher's Exact test was used to compare various characteristics. Subsequently, we will also perform multivariate logistic regression to risk-adjust between the two time periods for variables.
RESULTS: There was a marked improvement in the admission temperatures < 360 C of VLBWI (30.4% vs.44.4%; post and pre-QI measures respectively) despite increase in Cesarean section rates (74.1% vs. 62.1%). A decrease in mortality (7% vs.14.7%), death or morbidity (36.8% vs.48.3%), incidence of intraventricular hemorrhage ≥ Grade 3-4 (5.8% vs. 12.6%), chronic lung disease (25.5% vs.30.1%), severe retinopathy of prematurity (4.7% vs.14.3%), median length of stay (58.0 d vs. 61 d) were seen after the QI measures were implemented. There was a trend towards statistical significance.
CONCLUSIONS: After implementation of QI measures: 1. Interim data shows a significant improvement in admission temperature amongst VLBWI. 2. Reduction in mortality rates and the incidence of major morbidities has been demonstrated. However, we would need to account for confounders before attributing these changes to improved admission temperature alone. 3. No adverse outcomes have been observed so far. 4. Multi-disciplinary approach, employing defined strategies, global and targeted education and buy-in from stakeholders is recommended.

121 Fellow in Training

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Short Term Effects of the Use of Incubator Covers on Preterm Infants with Birthweight Less Than 1500 grams

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BACKGROUND: It is recommended by the Academy of Pediatrics that a safe noise level for a premature infant is 45 decibels (dB). The average ambient noise levels range from 50-88 dB with peaks over 100 dB at times in some NICU's which can be hazardous to infant development. Additionally, continual light exposure may affect the sleep states of premature infants. Some basic and clinical research sources exist to support the use of incubator covers to minimize external sensory stimuli. Very little data is available on the effects of external stimuli on saturations and apnea episodes. This study aims to quanitfy the benefits of incubator covers in premature infants.
OBJECTIVE: To evaluate whether incubator covers have any short-term effects on breathing pattern and desaturation episodes in a stable preterm infant.
DESIGN/METHODS: A prospective study on stable infants born under 1500 grams birth weight. Inclusion criteria: All infants under 1500 grams who are stable in an incubator. Exclusion criteria: Critical ill infants/infants with PPHN will be excluded from the study. Infants' pulse oxymeter trends and decibel meter were downloaded for a 24 hour period from patients in a covered incubator and were compared to trends from those infants in uncovered incubators. All data downloaded

using the Profox software. 24-hour trend recording was used to compare the intervention pre and post incubator covers. Every infant was routinely monitored as per the unit protocol. A Two-way ANOVA was used to compare the two groups with correlation to the environmental decibel levels using the Pearson correlation coefficient. P value of <0.05 is considered statistically significant.
RESULTS: The desaturation index is defined by number of desaturation events per hour. The desaturation index with the incubator cover on was 25.5± 15.3 events and 38.1± events with the cover off. The desaturation events per hour were 27.5% less with the incubator cover on compared to the covers off with P value of 0.02. Infants had 45 % less oxygen fluctuation and the percent of desaturations under 89% was 6% with the cover off and 3.8% cover off with a P value of 0.01. There was no difference in heart rate variability.
CONCLUSIONS: We conclude that the use of incubator covers has a positive effect with fewer desaturation events and less fluctuations on saturations limits as evident by a statistically significant P values.

Neurobiology II Platform Session

Saturday, March 27, 2010
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Mechanism of Activation of cAMP Response Element Binding (CREB) Protein during Hyperoxia in Neuronal Nuclei of Newborn Piglets

Erica Mandell, Shilpa Dass, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos.

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BACKGROUND: There is growing concern over the detrimental neurologic effects to the human newborn caused by exposure to increased oxygen concentrations during resuscitation. We have shown that hyperoxia in newborn piglets results in increased generation of oxygen free radicals in the cerebral cortex resulting in increased expression of proapoptotic proteins and DNA fragmentation. It is known that intranuclear Ca^{++} regulates nuclear functions as Ca^{++}-dependent cAMP response element binding (CREB) protein mediates transcription of apoptotic proteins. N-acetylcysteine (NAC), an antioxidant and oxygen free radical-scavenger that increases intracellular GSH, may ameliorate the free radical mediated nuclear membrane damage.
OBJECTIVE: The present study tests the hypothesis that hyperoxia-induced increase in CREB protein phosphorylation in neuronal nuclei of the cerebral cortex of newborn piglets is oxygen free radical mediated.
DESIGN/METHODS: Newborn piglets were assigned to three groups: normoxia (Nx,n=5), hyperoxia (Hx,n=6) and hyperoxia pretreated with *N*-acetylcysteine (Hyx +NAC, 100mg/kg i.v. 30 min prior to hyperoxia, n=3). ATP and phosphocreatine (PCr) were determined biochemically. Nuclei were isolated and nuclear proteins were separated by 10% SDS-PAGE, probed with anti-Ser^{133} phosphorylated CREB antibody. Complexes were detected by enhanced chemiluminescence, analyzed by imaging densitometry and expressed as absorbance ($ODxmm^2$).
RESULTS: ATP (µmoles/g brain) was 4.7±0.3 in Nx and 4.9±0.4 in the Hyx group (p=NS) 4.28±0.3 in the Hyx+NAC group. PCr (µmoles/g brain) was 4.1±0.3 in Nx and 4.0±0.4 in the Hyx group (p=NS) and 4.2±0.4 in Hyx+NAC group. Density of phosphorylated CREB protein ($ODxmm^2$) was 28.87±10.06 in Nx, 55.08±8.09 in Hyx, (p<0.05 vs Nx), and 35.55±0.78, in Hyx + NAC (p<0.05 vs. Hyx). The data show that *N*-acetylcysteine administration prior to hyperoxia prevents the hyperoxia-induced increase in CREB protein phosphorylation.
CONCLUSIONS: Since *N*-acetylcysteine inhibits nuclear CREB phosphorylation, we conclude that the mechanism of hyperoxia-induced activation of CREB protein is oxygen free radical mediated. We speculate that free radicals generated during hyperoxia modify nuclear membrane leading to increased nuclear Ca^{++}-influx and subsequent activation of CaM kinase IV that results in increased CREB phosphorylation and transcription of proapoptotic proteins. (NIH-HD 20337)

123 Fellow in Training

4:30 PM

Insulin Growth Factor (IGF) Signaling Pathway Is an Important Defense Against Hypoxic Neuronal Injury

Saima Aftab, Robert Kalb.

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BACKGROUND: The neonatal brain is extremely vulnerable to hypoxic injury yet not all neurons are equally susceptible. The underlying mechanism of selective neuronal vulnerability is unknown. The soil nematode *Caenorhabditis elegans (C. elegans)* has several useful features that enable mechanistic investigation of the selective neuronal vulnerability phenomenon. Prior work on *C. elegans* has identified several pathways that protect these worms against hypoxia. While these pathways are known to provide organismal survival advantage in a hypoxic environment, the effect of these hypoxia resistance pathways on neuronal survival is unknown. Of particular interest is the IGF pathway. A loss of function allele of *daf-2* (IGF receptor), in e1370 mutant strains show excellent survival in hypoxia. We investigated the hypothesis that reduced IGF signaling would also protect neurons against hypoxic insults.
OBJECTIVE: To study the effect of sub lethal hypoxic insult on the AFD neurons and explore protective effect of the IGF pathway in e1370 mutant *C. elegans*.
DESIGN/METHODS: We generated worms in which green fluorescent protein (GFP) expressing AFD neurons were placed in an e1370 background. We subjected synchronized larval stage L4 worms to 24 or 48 hrs of anoxia at 20° C and the integrity of AFD neurons were examined at 2 and then 72hrs after return to normoxia. The degree of neuronal injury was graded from normal to severe injury.
RESULTS: After 24 hr anoxia about 80-90% of both wild type and e1370 mutant worms survived. Examination of the morphology of AFD neurons revealed a difference in the severity of axonal injury between both groups. Only 8% of wild type worms showed a normal morphology of the AFD neurons 2 hrs after the insult while 53% of the e1370 worms were found to be normal. Though the degree of neuronal injury in both groups was mostly mild to moderate the e1370 mutants were remarkably protected. When examined at 72 hrs after the insult a greater severity of neuronal injury was noted than at the 2 hr mark but again e1370 worms remained protected. A 48hr anoxic insult similarly showed a more severe axonopathy in wild type worms than e1370 mutants both at 2 hrs and 72 hrs after the insult.
CONCLUSIONS: The AFD neurons of *C. elegans* are vulnerable to hypoxic insult and reduction in IGF receptor activity is protective against neuronal insult. This assay is a valuable tool in both identifying selective neuronal populations vulnerable to hypoxia and other hypoxic defense pathways.

124 Fellow in Training

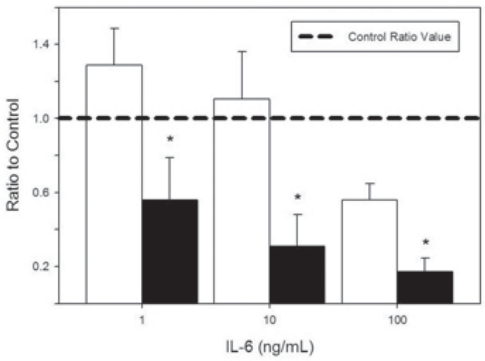
4:45 PM

Interleukin-6 (IL-6) Reduces Tight Junction Protein Expression in Cerebral Cortical Microvessel Endothelial Cells from Young and Adult Sheep

Susan S. Cohen, Erin E. Cummings, Grazyna B. Sadowska, Steven W. Threlkeld, Surendra Sharma, Barbara S. Stonestreet.

Department of Pediatrics, Women & Infants Hospital of Rhode Island, Providence, RI; Department of Neuroscience, Brown University, Providence, RI.

BACKGROUND: The blood-brain barrier is a selective diffusion barrier that maintains central nervous system homeostasis. The blood-brain barrier is composed of endothelial cells connected by intercellular tight junctions that limit the entry of substances that could alter neuronal function. Pro-inflammatory cytokines have been implicated in the genesis of neonatal brain injury and may alter the protein constituents of tight junctions.
OBJECTIVE: To examine the effect of the pro-inflammatory cytokine IL-6 on tight junction protein expression using an *in vitro* model of the blood-brain barrier. We hypothesized that IL-6 down-regulates key protein constituents of the endothelial tight junctions.
DESIGN/METHODS: Microvessels from young (n = 5) and adult (n = 3) ovine cerebral cortex were isolated after dissection, homogenization, and filtration. Microvessels were placed into culture, incubated with IL-6 at doses of 0 (control, phosphate buffered saline), 1 (low), 10 (middle) and 100 (high) ng/mL for 24 hours, harvested and preserved for protein analysis by Western immunoblotting for claudin (CL)-5. Densitometry was performed and results are expressed as a ratio to control values.
RESULTS: IL-6 treatment reduced CL-5 expression in cerebral cortical microvessels from young (ANOVA, for IL-6 dose, F = 3.4, P < 0.05) and adult (F = 10.2, P < 0.01) sheep. Figure: Open bars = young; closed bars = adult; * P < 0.05 vs. control value for same group.



CONCLUSIONS: We conclude that IL-6 down-regulates CL-5 expression in cerebral cortical microvessels from young and adult sheep. We speculate that pro-inflammatory cytokines predispose to brain damage in part by down-regulating the tight junction proteins of the blood-brain barrier, thereby disrupting barrier integrity and potentially permitting entry of substances that could damage the brain.

125 Fellow in Training

5:00 PM

Nitric Oxide Counters the Hyperoxia-Induced Pro-Inflammatory Phenotype in Astrocytes

Christie Bruno, Todd Greco, Harry Ischiropoulos.

The Children's Hospital of Philadelphia and the University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Studies have suggested that oxidative stress may injure the brain during neonatal exposure to hyperoxia, while nitric oxide's effect on the brain remains uncertain.Studies suggest that astrocytes may play a role in these processes as they participate in neurogenesis, synaptogenesis, neurotransmitter consumption and release within the central nervous system (CNS).Exposure to various stimuli results in distinctive phenotypic changes referred to as astrogliosis.Astrogliosis is characterized by increased cell size, number and expression of glial fibrillary acidic protein (GFAP).

OBJECTIVE: Our objective is to determine if hyperoxia(O_2) with or without nitric oxide(NO) induces astrogliosis.We will expand the definition of astrogliosis to include pathway-specific analysis of protein expression, secretion and elaboration of inflammatory mediators.
DESIGN/METHODS: Astrocytes were prepared from newborn mouse brain (P1) and grown in culture until confluency was achieved.Cells were then exposed to O_2, NO, NO plus O_2 or RA for 48 hours.Cells were harvested and analyzed for viability (n=3), morphology (n=3), protein expression and secretion (n=3) as well as cytokine secretion (n=3).
RESULTS: Astrocytes exposed to O_2 exhibited decreased viability ($p<0.01$), while cells exposed to NO and NO plus O_2 showed no difference in viability. Evaluation of the exposed cells revealed no significant morphologic differences, except for a decrease in process number with O_2 plus NO exposure ($p<0.05$).Cytoskeletal GFAP and Vimentin were not different amongst the exposure groups. Increased proliferating cell nuclear antigen (PCNA) was measured with O_2 ($P<0.05$), and decreased with NO and NO plus O_2 exposure($p<0.01$).Cellular COX2 was increased with O_2 and decreased with NO exposure ($p<0.05$). Increased PGE2 was evident in the media of O_2 exposed cells and decreased with NO exposure ($p<0.01$).Apo E in cell lysates and conditioned media decreased with O_2 and increased with NO exposure($p<0.01$).Cell lysate clusterin increased with O_2 and decreased with NO ($p<0.01$), with no difference in secretion.
CONCLUSIONS: Astrocytes ex vivo respond to hyperoxic challenges with increased cellular proliferation, decreased expression of ApoE, increased expression of clusterin, and increased expression and secretion of inflammatory mediators, all of which may contribute to neonatal brain injury.These changes are countered by exposure to nitric oxide suggesting that NO exposure may confer beneficial effects in the brain.

126 Fellow in Training

5:15 PM

Mechanism of Caspase-3 Activation during Hyperoxia in the Cerebral Cortex of Newborn Piglets

Lynn Fuchs, Heidi Taylor, Qazi Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos.

Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Phila, PA.

BACKGROUND: Previously we have shown that hyperoxia results in increased activation of caspase-3 in the cytosolic fraction of the cerebral cortex of newborn piglets. We have also shown that hyperoxia results in increased nitration of neuronal proteins indicating generation of nitric oxide (NO) free radicals in the cerebral cortical tissue. Nitric oxide generated during hyperoxia may alter the activity of caspase-3 by NO-mediated modification of the sulfhydryl (-SH) group at the cysteine residue of caspase-3 enzyme.
OBJECTIVE: The present study tests the hypothesis that the hyperoxia-induced increased activation of caspase-3 in the cytosolic fraction of the cerebral cortex of newborn piglets is mediated by nitric oxide derived from neuronal nitric oxide synthase (nNOS).
DESIGN/METHODS: Piglets were divided into: normoxic (Nx, n=4), hyperoxic (Hyx, n=4) and hyperoxic-pretreated with a highly selective nNOS inhibitor 7-nitro-indazole sodium (Hyx-7-NINA, 1 mg/kg, i.v., 60 min prior to hyperoxia, n=5) groups. Hyperoxia was induced by exposure to an FiO_2 of 1 to maintain PaO_2 at >400 mmHg for 120 min. ATP and phosphocreaine (PCr) were determined biochemically to document cerebral energy status. Cytosolic fraction was isolated from the cerebral cortical tissue and caspase-3 activity was determined spectrofluorometrically at 37°C for 600 sec using a specific fluorogenic synthetic peptide substrate for caspase-3.
RESULTS: ATP (μmoles/g brain) was 4.9±1.1 in the Nx group, 5.1±0.5 in the Hyx group (p=NS), and 4.8±0.7 in the Hyx+7-NINA group (p=NS). PCr (μmoles/g brain) was 3.3±0.6 in the Nx group, 3.2±0.5 in the Hyx group (p=NS), and 3.1±0.4 in the Hyx+7-NINA group (p=NS). Caspase-3 activity was 1.51±0.46 in Nx, 4.67±1.18 in Hyx ($p<0.05$) and 1.72±0.60 in Hyx+7-NINA ($p<0.05$ vs Hyx). The data show that hyperoxia results in increased activity of caspase-3 in the cytosolic fraction of the cerebral cortex of newborn piglets and administatration of a highly selective nNOS inhibitor prevented the hyperoxia-induced increased activity of caspase-3.
CONCLUSIONS: We conclude that the hyperoxia-induced increased activation of caspase-3 in the cerebral cortex of newborn piglets is mediated by nitric oxide derived from nNOS. We speculate that the increased activation of caspase-3 occurs through NO-mediated modification of sulfhydryl (-SH) group of cysteine residue in caspase-3 protein. (Funded by NIH-HD 20337)

127 Fellow in Training

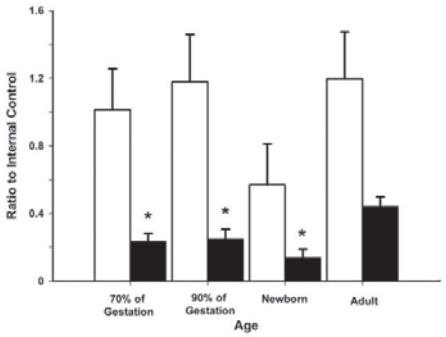
5:30 PM

Age Dependent Inter-Alpha Inhibitor Protein (IAIP) Expression in Ovine Cerebral Cortex (CC)

Mariya Spasova, Steven Threlkeld, Grazyna Sadowska, Yow-Pin Lim, Barbara S. Stonestreet.

Pediatrics, Women and Infants Hospital, Providence, RI; Prothera Biologics, Providence, RI.

BACKGROUND: IAIPs are a family of proteins found in plasma in relatively high concentrations. IAIPs are important in inflammation, wound healing, and reduce pro-inflammatory cytokines during systemic inflammation and neonatal sepsis**.** IAIPs are composed of common light chain and many closely related heavy chains (HC). IAIPs given intravenously reduce ischemic-reperfusion brain injury in adult rats. The HC also play a role in organization and maintenance of the extracellular matrix. Data is not available regarding IAIP expression in the brain of any species.
OBJECTIVE: To examine the effects of maturation on IAIP expression in the CC of fetuses at 70% and 90% gestation, and in newborn and adult sheep.
DESIGN/METHODS: CC samples were obtained from fetuses at 70% and 90% of gestation, newborn, and adult sheep and frozen. Protein expression was determined by Western immunoblot, densitometry performed and results expressed as a ratio to an internal control sample.
RESULTS: The IAIPs were detected in brain tissue as 250 kDa and 125 kDa protein bands by Western immunoblot using a specific antibody against IAIPs. The expression of the 250 kDa IAIP was higher in adult sheep than in the fetuses at 70% and 90% and in the newborn lambs (ANOVA, $F = 6.1$, $P < 0.05$). The 125kDa IAIP did not differ significantly among age groups ($F = 1.33$, $P = 0.32$). Figure: open bars = 125kDa IAIP; closed bars = 250 kDa IAIP; * $P < 0.05$ vs. adult values.



CONCLUSIONS: The presence of the IAIPs were detected for the first time in the brain from early in fetal and throughout ovine development as both 125 kDa and 250 kDa proteins. The expression of the 250 kDa proteins is higher in the adult than in the newborn and fetal cerebral cortices. Although the functions of IAIPs in the brain are not known, their presence in relatively high amounts raises the interesting possibility that they represent endogenous anti-inflammatory and neuroprotective molecules in the brain.

Immunizations Platform Session

Saturday, March 27, 2010
4:15 PM-5:45 PM

128 Medical Student

4:15 PM

Three-Year Experience with Administration of Trivalent Inactivated Influenza (TIV) Vaccine to Parents of High-Risk Infants in the Neonatal Intensive Care Unit (NICU) Demonstrates Sustainability

Angeline Seah, Shetal Shah.

Pediatrics, Stony Brook University School of Medicine, Stony Brook, NY.

BACKGROUND: Influenza mortality in infants under 6 months of age with chronic respiratory disease is the highest of the pediatric age group. TIV vaccination is recommended for adults in contact with infants < 6 months of age. Significant barriers to adult vaccination exist including cost, convenience, & access. NICU-based administration of TIV to parents of admitted infants has been shown to increase immunization rates over one season, however issues regarding sustainable implementation of this program have been raised.
OBJECTIVE: To determine the feasibility of TIV administration to NICU parents over a three-year period and examine year-to-year differences in immunization rates.
DESIGN/METHODS: For a four-month period from November to March for the 2004-05, 2006-07 and 2008-09 flu seasons, all parents of admitted patients to our NICU were informed of the risks & benefits of TIV. All staff were educated about the dangers of influenza infection & instructed to reinforce the need to obtain vaccination. Parents were screened, medically consented, & immunized at their infant's bedside. Immunization was available for 20 hrs per day at no cost. Data on TIV risk factors, immunization rates, and patient demographic factors was obtained
RESULTS: Over the study period, 752 parents were screening for TIV administration. The rate of immunization screening remained fixed (78% to 81% per year). Immunization rate of parents did not vary significantly, (95% in 04-05, 92% in 06-06, and 91% in 08-09). The rate parents already receiving TIV prior to the infant's NICU admission varied from 11.8% in 06-07 to 33% in 08-09. Rates of maternal immunization prior to NICU admission have risen steadily, from 18% in 04-05 to 23% in 06-07 to 46% in 08-09. Paternal immunization rates have varied from 1% to 19.8%. There was no significant difference in gestational age, length of stay, or time to immunization between the three years.
CONCLUSIONS: Administration of TIV in the NICU is a sustainable mechanism for effective immunization of parents. Immunization rates of pregnant mothers are rising compared to 5 years ago in our single center study. Paternal immunization rates, however, are significantly lower than maternal vaccination and should remain an area of focus for primary care providers, OB-GYNs, and pediatricians.

129 House Officer

4:30 PM

Impact of a Tdap Postpartum Intervention on Timeliness of Early Infant Immunization

Ishminder Kaur, Krissa George, Carolina Pena-Ricardo, Barbara Watson, Barbara Kelly.

Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA; Division of Disease Control Immunization Program, Department of Health, Philadelphia, PA.

BACKGROUND: In 2007, 2 infants in Philadelphia died of pertussis contracted from their mothers. To decrease pertussis transmission, in 2008 the Philadelphia Department of Health launched a successful Tdap vaccination initiative for postpartum mothers at 3 regional hospitals. The effect of vaccination of postpartum mothers on subsequent infant vaccination is not well known.
OBJECTIVE: To examine the impact of a Tdap maternal postpartum intervention on subsequent

timeliness of infant immunization.
DESIGN/METHODS: We conducted a retrospective cohort study of infants born at Albert Einstein Medical Center in Philadelphia, PA, an academic hospital serving a minority, low income, urban community. On 5/08, a Tdap postpartum intervention was initiated, consisting of Tdap standing orders, nursing education, verbal consent for vaccination, and written refusal (opt out). We compared a Tdap intervention group consisting of all newborns discharged July 2008 (n=250, 238 mothers received Tdap, 12 refused) with a pre-Tdap control group consisting of all newborns discharged July 2007 (n=238). Infants' immunizations were tracked for 9 months in the Philadelphia Immunization registry (KIDS Registry). Outcome measures were completeness of the first set of vaccinations by 3 months, and completion of primary series by 8 months and by 9 months. Infants without a record in KIDS Registry were excluded (29 in Tdap group, 35 controls).
RESULTS: There was no difference in maternal age in the 2 groups, with the majority of mothers aged 20-34 years. The infants whose mothers received Tdap in the postpartum period were more likely to receive their first set of immunizations by 3 months of age (88% vs 82%,$p < 0.05$). Infants were also more likely to be up to date with the primary series by 8 months of age (67% vs 57%, $p<0.05$), and by 9 months(75% vs 65%, $p < 0.05$).
CONCLUSIONS: A Tdap maternal postpartum intervention had a positive impact on subsequent timeliness of early infant immunization. In addition to increasing maternal immunity and protection of newborns, postpartum interventions have the potential to increase child immunization coverage.

130 House Officer

4:45 PM

Effect of Rotavirus Vaccination on Hospitalization and Seasonality of Disease from Rotavirus Infection in Pediatric Patients

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Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Psychology, Touro College, NY, NY.

BACKGROUND: Rotavirus is the most common cause of severe acute gastroenteritis (AGE) in the United States and worldwide. Since the introduction of rotavirus vaccines (RV) in 2006, reports have shown decreases in hospitalizations and rotavirus AGE in the U.S.
OBJECTIVE: To determine changes in hospitalization rate and seasonality of rotavirus AGE in infants and children from birth to 6 years of age, before and after institution of RV
DESIGN/METHODS: This was a retrospective, descriptive, comparative study. Data were obtained from databases of Flushing Hospital Medical Center (FHMC) for all admissions of patients aged 0-6 years, the microbiology laboratory for results of rotavirus testing, and the New York City Vaccine Registry for patient vaccination histories. Stool tests for rotavirus antigen were done using enzyme immunoassay. An historical control group comprised patients 0-6 years of age admitted to FHMC from Sept 2004-Aug 2005 with a diagnosis of rotavirus AGE, and a comparator group comprised similar patients admitted from Sept 2007-Aug 2009 (after institution of RV at our hospital).Total monthly pediatric admissions during the study periods and discharge diagnoses were derived from the database. We recorded the date of admission and results of rotavirus testing for all patients, and immunization histories for the study group only. We excluded patients who received RV ≤ 3 weeks before being tested for rotavirus and patients with unknown immunization histories. Studies were analyzed statistically using frequency distribution analysis.
RESULTS: We reviewed 494 patients tested for rotavirus during the study periods; 97 were positive Obvious decreases in the hospitalization rates from rotavirus AGE in the pre-RV year (12.5% total admissions) to the two post-RV years (1.8% for 1st year, 3.5% for 2nd year) were seen, and there was a notable change in the seasonality of disease. In the pre-RV era, rotavirus admissions rose from Nov-Feb, peaked from Feb-May, and then declined. In the post-RV era, there were fewer cases, wider scatter, and a peak in April. Among patients who developed rotavirus AGE, none were fully immunized with RV.
CONCLUSIONS: There was a decrease in the hospitalization rate from rotavirus AGE after institution of RV at our hospital, and a notable change in the seasonality curve for rotavirus disease. Patients who were not vaccinated with RV were more likely to be admitted with AGE.

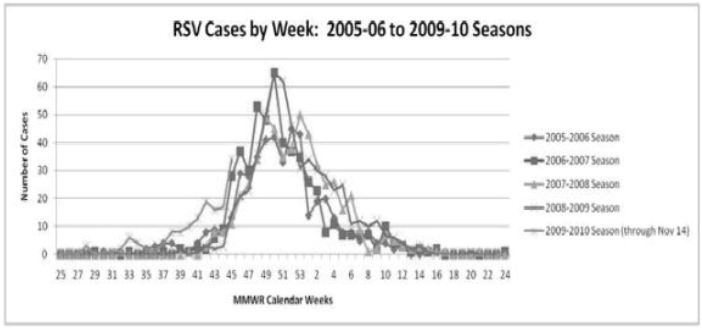
131 Fellow in Training

5:00 PM

Getting the RSV Season Onset and Offset Right To Optimize Immune Prophylaxis

Jennifer Vodzak, Yolanda M. Inumerable, Alan T. Evangelista, Sarah S. Long.
St. Christopher's Hospital for Children (SCHC), Philadelphia, PA; Drexel University College of Medicine, Philadelphia, PA.

BACKGROUND: Variation in the timing of RSV activity in a community makes it difficult to predict RSV outbreaks. The AAP has recommended maximum of 5 monthly doses of palivizumab prophylaxis (PP). CDC defines RSV season onset/offset as presence/absence of 2 consecutive weeks with ≥2 positive tests/wk and ≥10% positive results/tests performed/wk. During pandemic 2009 H1N1, we noted an unusual upswing of RSV cases in Sept/Oct, both factors which added complexity to the definition of RSV season onset.
OBJECTIVE: We hypothesized that precise real-time assessment of regional community patterns of RSV in the context of concurrent circulating viruses may be important to guide palivizumab prophylaxis.
DESIGN/METHODS: SCHC has an on-site virus isolation laboratory. RSV cases (RSV+) are identified routinely by DFA on nasal wash specimens. During weekend off-hours only specimens are tested by EIA and negatives are re-tested by DFA. RSV test results were reviewed from June 2005 through November 14, 2009.
RESULTS: An average of 481 cases (range 449-520) occurred annually for 4 full seasons (fall '05 to spring '09) and 148 cases from July-Nov 14, 2009.



Offset of season was abrupt for all years, including 2009 (no wk with ≥2 RSV+ in spring after wk 15). Interseason hiatus of few (<2) or no (0) RSV+/wk differed by years: hiatus only 15 and 10 weeks, resp, for '09 vs mean 24.2 and 18.5 weeks, resp, for '05-08. In 2009, there were 13 weeks with ≥2 RSV+/week prior to meeting the CDC definition of season onset, which occurred in week 45. In weeks 39 though 44, >5% but <10% of tests were RSV+, although there was an average of 13.8 cases per week. If 2009 H1N1 positive tests are removed from total number of tests performed, case definition for RSV season would have been met in week 43.
CONCLUSIONS: The onset shoulder of the 2009 RSV season was unusually broad. Meeting the 10% threshold was confounded by concurrent 2009 H1N1. Better understanding of factors affecting RSV seasonality will permit optimal RSV prophylaxis.

132 Fellow in Training

5:15 PM

Extent and Timeliness of Seasonal Influenza Vaccine Coverage in Children from an Underserved Community, 2004-2008

Annika M.O. Hofstetter, Karthik Natarajan, Raquel Andres Martinez, Melissa S. Stockwell.
Department of Pediatrics, Columbia University, New York, NY; Department of Population and Family Health, Columbia University, New York, NY.

BACKGROUND: Influenza is a significant source of morbidity and mortality in children. Full coverage rates remain low, particularly in those children under 9 years who require 2 vaccine doses to obtain optimal efficacy. Latino children appear to be at increased risk of influenza under-immunization, yet studies examining the extent and timeliness of coverage in this population are limited.
OBJECTIVE: To examine the extent and timeliness of influenza vaccine coverage in children from an underserved community in New York City during the 2004-5 through 2008-9 seasons.
DESIGN/METHODS: In this retrospective cohort study, influenza vaccination rates were evaluated in 23,745 children from a predominantly Latino underserved community using the New York Presbyterian Hospital immunization registry. Five cohorts included children who were 6 month-8 years in the 2004-5 through 2008-9 seasons. Trends in partial and full coverage rates over the 5 seasons were analyzed using Pearson's correlation. Student t test compared timeliness of vaccination, which was defined by full coverage rates by November 15 or December 15 of each season for children requiring 1 or 2 doses, respectively, as well as the number of days between doses for those needing 2 doses. Multivariable analyses determined the effect of race/ethnicity, language, and insurance status on coverage rates and timeliness during the 2008-9 season.
RESULTS: Children were primarily Latino (60%) and had Medicaid (77%). Full coverage rates increased between the 2004-5 and 2008-9 seasons, particularly for 24-59 month-olds (8% vs 38%; R^2=0.82, p<0.05) and 5-8 year-olds (7% vs 22%; R^2=0.94, p<0.01). Few children who needed 2 doses received both doses (19-28% of 6-23 month-olds, 0-7% of 2-8 year-olds per season). Latino children had lower partial (AOR 0.77, 95% CI: 0.70, 0.84) and full coverage rates (AOR 0.85, 95% CI: 0.77, 0.93). Vaccine timeliness was delayed in nearly all children requiring 1 (67-91%) or 2 doses (90-100%), particularly in older age groups. In children who received 2 doses, the duration between doses was almost twice as long as recommended and worsened over the 5 seasons (54 days in 2004-5; 64 days in 2008-9, p<0.0001).
CONCLUSIONS: The majority of children from this underserved community had inadequate or delayed influenza vaccine coverage. Parental, provider, and system-based factors that influence influenza vaccination in this population must be explored.

133 House Officer

5:30 PM

Parental Knowledge and Attitudes towards Human Papillomavirus Vaccine and Willingness To Vaccinate Urban Adolescents

Alina Stanica, Patricia Burris-Warmoth, Louis Primavera, Fernanda Kupferman-Meik.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Psychology, Touro College, NY, NY.

BACKGROUND: Studies have assessed parental knowledge and attitudes towards human papillomavirus vaccine (HPVV) and its introduction in the immunization schedule, but little is known about how such knowledge and attitudes affect the vaccination status of children.
OBJECTIVE: To assess the relationship between parental knowledge and attitudes towards HPVV and the willingness to vaccinate their daughter.
DESIGN/METHODS: This was a quasi-experimental study with nonequivalent groups. The parents of girls aged 9-18 years who presented to the clinic of a community hospital were asked to complete a survey in English or Spanish, consisting of 30 questions culled from previously validated questionnaires, with demographic data, attitudes towards vaccination, knowledge and attitudes towards HPV infection and HPVV. After completion of the survey, HPVV was offered for

their daughter, without knowledge of the sealed responses. Acceptance or refusal was noted on the sealed envelope. Data were analyzed statistically with frequencies and Chi-Square test.
RESULTS: Forty subjects participated in the study. Most parents (87.5%) had a positive attitude towards vaccination in general and towards HPVV (85%). Older parents were statistically more likely to consent for HPVV for their daughters and the rates of consent increased with the age of their daughters. Among the 35 parents who had knowledge of HPV, 71.4% were aware of the mode of transmission (p=0.002), and 68.6% knew it caused cervical cancer (p=0.003). Over half the parents who knew these facts received the information from health professionals rather than from media (p=0.041). Only 35% of parents believed that HPVV would not promote risky sexual behavior. Almost all patients (97.5%) were offered HPVV, and most of their parents consented (80%). Among parents who refused HPVV for their daughter, 87.5% received their HPV information from media, while 12.5% of them received it from health professionals (p=0.009). Only 30% of parents believed their daughter is at risk for HPV infection.
CONCLUSIONS: Most parents had knowledge of HPV and were willing to vaccinate their daughters, but the information was not always accurate and complete. Parents seemed to have a false sense of security regarding their daughters' exposure to HPV. Parents who were older received HPV information from health professionals, and had older adolescent daughters were more likely to consent for HPVV.

Cardiovascular Platform Session

Saturday, March 27, 2010
4:15 PM-5:45 PM

134 Fellow in Training

4:15 PM

Donor Troponin I Levels and Graft Survival in Pediatric Heart Transplantation

Kimberly Y. Lin, Patrick Sullivan, Abdul Salam, Beth Kaufman, Stephen Paridon, Brian D. Hanna, Thomas L. Spray, Janice Weber, Robert E. Shaddy.
Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA; Surgery, Children's Hospital of Philadelphia, Philadelphia, PA.
BACKGROUND: Troponin I (TnI), a biomarker that reflects myocardial damage in patients with acute coronary syndromes, is often obtained during evaluation of a potential transplant donor heart. It is unclear whether any elevation in donor TnI levels can predict an adverse outcome and should thus preclude acceptance of a donor heart.
OBJECTIVE: The aim of this study was to examine whether TnI levels predict graft failure in pediatric heart transplantation.
DESIGN/METHODS: Deidentified data on heart transplants performed in recipients ≤ 21 years old between 4/07-4/09 was provided by the Organ Procurement and Transplantation Network. Donor TnI level and recipient survival without retransplantation (graft survival) were examined for statistical correlation. Other donor and recipient variables were examined as possible predictors of graft failure.
RESULTS: Overall graft survival in the 846 heart transplants performed was 81.1% at 2 years. 662 donors had at least one TnI level recorded prior to transplant, with values ranging from 0-50 ng/ml (median 0.1). Using the last donor TnI level reported prior to graft harvest, there was no correlation between TnI level and graft failure (p=0.635). An ROC curve suggested no association between TnI and graft status (AUC=0.52; p=0.59), and there was no difference in graft survival (p=0.519) among quartiles of of TnI (≤0.04, 0.04-0.1, 0.1-0.35, ≥0.35 ng/ml). 72 transplanted donors had a TnI ≥1; graft survival was not associated with TnI≥1(78%) vs TnI≤1(82%) at 2 years (p=0.961). TnI values were also not associated with post-transplant hospital length of stay (r=-0.035; p=0.372).
CONCLUSIONS: In donor hearts accepted for pediatric heart transplantation, pre-harvest TnI elevations are not associated with increased graft failure. Further prospective studies are needed to help determine whether a threshold value for elevated troponin in heart transplantation exists. This work was supported in part by Health Resources and Services Administration contract 234-2005-370011C. The content is the responsibility of the authors alone and does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

135 Medical Student

4:30 PM

Transient In Utero Knockout (TIUKO) of the CFTR Gene Results in Increased Levels of Myocardial Inflammatory Markers in Adult Sprague-Dawley Rat Pups

Rachael Grodick, Angeline Seah, J. Craig Cohen, Shetal Shah.
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BACKGROUND: Mechano-sensory forces provide developmental stimuli in the embryologic development of the lungs, heart and intestine. In utero, these forces are mediated by the CFTR gene, which ultimately results in actin and myosin contraction generating the contractile force required in gestational development.TIUKO of the CFTR gene results in obesity, insulin resistance and the presence of visceral adiposity.Interleukin 1beta (IL-1B), Interleukin 6 (IL-6), Matrix Metalloproteinases 10, 12 (MMP 10, 12), Nitric Oxide Synthase 2 (NOS-2) and Tumor Necrosis Factor Alpha (TNF-alpha) are well described, time-dependent, markers of myocyte inflammation.
OBJECTIVE: To determine the levels of these inflammatory markers in the myocytes of adult Sprague Dawley rats subjected to the TIUKO procedure.
DESIGN/METHODS: Two litters of time-pregnant Sprague-Dawley rat pups underwent transient *in utero* knockout of CFTR via surgical laparotomy with an intra-amniotic injection of anti-sense CFTR (ASCFTR) using a replication-deficient adenovirus vector at 17 days gestation or control with injection of EGFP.Dames delivered naturally and the rat pups were raised in unfiltered. Hearts were harvested from 18-month old animals. Hematoxylin and Eosin (H&E) and interpreted by a blinded cardiac pathologist. Immuno-histochemistry was performed on frozen sections to assay for levels of IL-1B, IL-6, TNF-alpha, MMP10, 12 and NOS-2.Pixel count was used for quantification and 20 microscopic images per antibody were obtained. Unpaired T-testing with Welch's Correction using GraphPad software was used to determine significance.
RESULTS: H & E staining showed irregular nuclei, without gross evidence of hypertropy. Mean myocyte length did not differe between the two groups.All markers of inflammation were increased compared to control.TNF-alpha and Il-1Beta levels were significantly elevated compared to control ($p<0.003$, for both).IL-6 levels were increased as well ($p<0.009$). NOS-2 levels were increased in TIUKO animals ($p<0.0001$).MMP 10 and 12 were also elevated compared to control ($p<0.01$ and $p<0.0001$, respectively).
CONCLUSIONS: ASCFTR animals exhibited increased levels of markers associated with myocardial stress without gross anatomic hypertrophic changes.Interference with mechano-sensory processes during gestation results in elevated levls of protein associated with cardiac stress in adulthood.

136 Fellow in Training

4:45 PM

Intrauterine Growth Restriction Alters Norepinephrine Response in Rat Aortas in a Developmental and Gender Specific Manner

Catalina Bazacliu, Melissa Carmen, Bobby Mathew, Rita M. Ryan, Satyan Lakshminrusimha, Daniel D. Swartz.
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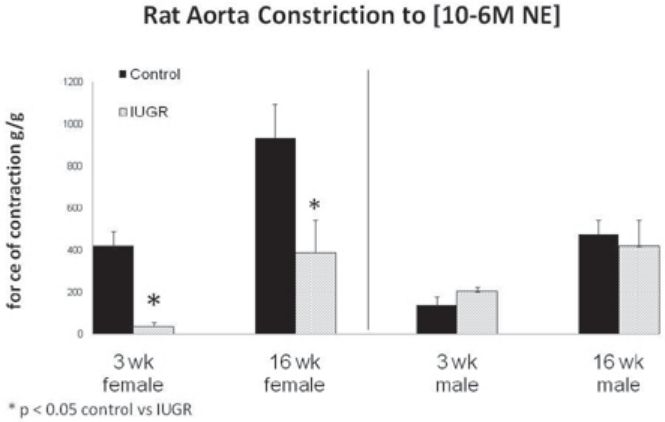
BACKGROUND: Intrauterine growth restriction (IUGR) affects 10% of all newborns. IUGR infants are found to be at increased risk of developing vascular / metabolic diseases (Barker, 1993; Woodall, 1996). In IUGR mice catch up growth normalized cardiovascular function in males but not females (Hermann, 2009).
OBJECTIVE: Our objective was to evaluate the gender and developmental differences in constriction response to norepinephrine (NE) in thoracic aortic rings from IUGR and control rats.
DESIGN/METHODS: Pregnant rats were fed a low protein diet (LPD) (8% protein) during pregnancy to induce IUGR; maternal LPD was continued until weaning at 3 wk, after which pups were placed on a high fat diet (32% fat) until 16 wk of age. Control rats were fed standard diet (19% protein) throughout the study. At 3 and 16wk, tracheal rings were removed and placed in an isolated tissue bath with Krebs Ringer solution bubbled with 5% CO2 and air. Constriction response to increasing concentrations of methacholine (10-8 to 10-4M) was recorded.
RESULTS: Eighteen IUGR rats and 14 controls were evaluated for aortic reactivity. At 3 wks of age, body weights of IUGR rats were significantly lower than controls (23±4g vs 48±6g) with no significant gender differences. At 16 wks, IUGR rats weighed similar to control rats. However, male rats weighted significantly more than females (427±23g vs 276±14g). Contractile response to NE was significantly higher in female control rats compared to IUGR females. In sharp contrast, no significant differences were noted between control and IUGR male rats at 3 and 16 weeks.



CONCLUSIONS: Maternal LPD resulted in IUGR at birth; high fat diet provided after weaning resulted in catch up growth by 16 wks. Maternal protein restriction did not affect NE-induced contractility in male rats but significantly impaired contractility in female IUGR rats at 3 and 16 weeks of age. This result indicates that maternal protein restriction may induce long term alteration of vascular reactivity in female offspring.

137 Fellow in Training

5:00 PM

Comparison of Mesenteric Tissue Oxygenation during Indomethacin and Ibuprofen Therapy for Patent Ductus Arteriosus in Preterm Infants

Mayoor Bhatt, Anna Petrova, Rajeev Mehta.
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BACKGROUND: Both ibuprofen (IBU) and indomethacin (INDO) are non-selective cyclo-oxygenase inhibitors that are effective for the medical closure of patent ductus arteriosus (PDA), a highly prevalent and potentially life-threatening condition in very preterm born infants. Concern remains regarding the impact of IBU or INDO therapy on the regional tissue oxygenation. No study has compared the effect on mesenteric perfusion.
OBJECTIVE: We hypothesized that INDO as compared with IBU, affects mesenteric tissue oxygenation. To test this hypothesis, we compared the effect of IBU and INDO therapy on the mesenteric tissue oxygenation in preterm infants.

DESIGN/METHODS: Preterm infants (GA < 32 wks, BW < 1500 gms) who required IBU or INDO therapy for medical closure of the PDA were included. Near infrared spectroscopy (NIRS) was used to measure the mesenteric (rSO2-M) tissue oxygenation and calculate fractional oxygen extraction (FOEm). Simultaneous measurements of hemodynamic parameters and oxygen saturation were obtained for 30 minutes prior to, during, and after infusion of INDO or IBU. The association between the medication used and regional mesenteric tissue oxygenation parameters was studied using a regression model.
RESULTS: Among the 38 infants included in the study, 20 received IBU and 18 were treated with INDO. There were no significant differences in the demographic and clinical data between the groups. As compared with the pre-infusion data, the rSO2-M decreased and FOEm increased during the infusion of IBU, whereas with INDO, the opposite effect was observed. Because the pre-infusion rSO2-M and FOEm in the IBU and INDO groups were significantly different, the effect of the drug used was studied in two models by including the collected hemodynamic parameters. Although the rSO2-M and FOEm prior to drug infusion were found to be the most important predictors, the adjusted rSO2-M and FOEm showed the same association with the infused medication. On average, 24-20% of the variation in rSO2-M and FOEm respectively, was associated with INDO therapy. Other parameters were found to be either less important or insignificant for predicting mesenteric oxygenation during the infusion of IBU or INDO.
CONCLUSIONS: As compared with IBU, the infusion of INDO was associated with an increase in the mesenteric tissue oxygenation and decrease in extraction, which could be the result of reduced oxygen consumption due to vasoconstriction.

138 PhD Postdoctoral Fellow

5:15 PM

Mitochondria Structure and Function Matures during Mammalian Cardiac Development

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BACKGROUND: The adult heart requires a precise coupling between oxidative metabolism, excitation, and contraction to provide sufficient energy for each heart beat. In contrast, the early embryo, due to the hypoxic environment in utero, generates energy mainly through anaerobic glycolysis. Although the heart is the first organ to become functional in the embryo, ensuring effective circulation, and embryonic survival by the mid-embryonic period, little is known about mitochondria as the embryonic heart matures.
OBJECTIVE: To investigate the maturation of mitochondrial structure and function in the embryonic murine heart.
DESIGN/METHODS: Whole hearts and primary cultures of cardiac myocytes from embryonic day (E) 9.5 to 13.5 were stained using vital dyes and by immunofluorescence and examined using epifluorescence and multiphoton microscopes.
RESULTS: Primary culture of embryonic ventricular myocytes at day 9.5 displayed less mitochondrial mass and mitochondria that were shorter in length and less organized, as they did not associate closely with the contractile apparatus and resided primarily around the nucleus and cell periphery. Compared to E9.5, E13.5 ventricular myocytes displayed greater mitochondrial mass, mitochondria that were longer, branched, and networked, as well as more organization and association of the mitochondria with the contractile apparatus. Data from whole heart using multiphoton and electron microscopy confirmed these findings. Functional measurements indicated that mitochondrial membrane potential was higher and reactive oxygen species production was lower at day E13.5 than at day E9.5.
CONCLUSIONS: Taken together, these data suggest that mitochondrial biogenesis and function may be important in the differentiation of early cardiac myocytes and the maturation of the heart.

139 Medical Student

5:30 PM

Modified Response to Calcium by PAK Phosphorylation of Cardiac Troponin I

Jonathan J. Edwards, John C. Robinson, Genaro Ramirez-Correa, Anne M. Murphy.
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Pediatric Cardiology, Johns Hopkins University School of Medicine, Baltimore, MD.

BACKGROUND: The cardiac contractile proteins, also called myofilament proteins, control heart fuction by comprising a calcium responsive motor of the myocardium. These myofilament proteins are controlled a dynamic balance of kinase and phosphatase activity that regulate both calcium (Ca2+) transit and the response of the myofilament proteins to calcium. Multiple kinases act on the myofilaments, however little is known regarding the role that the p21-activated kinase 1 (PAK-1) plays in regulating cardiac troponin I (cTnI). In this study we have focused on the cTnI PAK targeted phosphorylation site Serine-149, which is immediately distal to the key inhibitory region of cTnI. By developing transgenic (TG) mice that possess a pseudo-phosphorylated troponin I at Ser-149 to Asp (cTnI PAK-P) or a pseudo-dephosphorylated troponin I Ser-149 to Ala (cTnI PAK-DP) we determined what role this regulatory site might play in myofibril activation and therefore overall cardiac contractility.
OBJECTIVE: To compare the myofibrillar ATPase rate in cTnI PAK-P, cTnI PAK-DP, and non-transgenic (NTG) mice at increasing concentrations of Ca2+.
DESIGN/METHODS: The myofibrils were prepared from cardiac ventricular tissue, diluted in K-60 buffer (50mM imidazole, 50mM KCl, and 2mM MgATP), and protein concentrations were quantified using a Lowry based assay. The myofilaments were introduced, in a 96 well plate, to one of 12 increasing concentrations of Ca2+, and the ATPase activity was determined over 10 minutes at 31oC.
RESULTS: Myofibrils from each mouse type respond similarly by increased ATPase activity with increased Ca2+ concentrations. Maximal ATPase rate was significantly lower in cTnI PAK-P mice as compared to PAK-DP mice, 99±18 and 144±35 GIVE UNITS respectively ($p = 0.018$), and borderline significant to NTG mice, 124±28 ($p= 0.087$). Additionally, cTnI PAK-P mice were sensitized to Ca2+ at submaximal Ca2+ levels as compared to NTG mice, while cTnI PAK-DP were desensitized to Ca2+ at submaximal Ca2+ levels.
CONCLUSIONS: The two TG lines demonstrated divergent effects on maximal ATPase rates, although the maximal ATPase rate was not statistically different between either the cTnI PAK-P mice or the cTnI PAK-DP when compared to the NTG mice. Furthermore, the results demonstrate that the cTnI PAK-P mice demonstrated increased calcium sensitivity. Further studies will determine whether this increased calcium sensitivity results in diastolic dysfunction in vivo.

General Pediatrics II - Vulnerabilities Platform Session

Saturday, March 27, 2010
4:15 PM-5:45 PM

140 Fellow in Training

4:15 PM

Endocrine Disruptors and Childhood Social Impairment

Amir Miodovnik, Mary S. Wolff, Chenbo Zhu, Antonia M. Calafat, Minori J. Silva, Stephanie M. Engel.
Department of Preventive Medicine, Mount Sinai School of Medicine, New York, NY; National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA.

BACKGROUND: Endocrine disruptors (EDs) are hormonally active compounds that represent a broad class of molecules such as organochlorine pesticides, PCBs, phenolic compounds and phthalate esters; they are ubiquitous in the environment and have been linked to reproductive toxicity and neurodevelopmental effects in animals and humans. The prenatal period may be uniquely susceptible to the effects of EDs given the important role of both maternal and fetal thyroid and sex steroid hormones in brain development.
OBJECTIVE: Exposure to synthetic compounds that may affect brain development and behavior can be reduced and potentially eliminated. The purpose of this study was to investigate the impact of two categories of endocrine disruptors, phthalate esters and phenolic compounds, on milder forms of autistic social impairment in an inner-city cohort of children.
DESIGN/METHODS: The Mount Sinai Children's Environmental Health Study enrolled a multiethnic prenatal population from 1998-2002 (n = 404). Third trimester urines were analyzed for environmental phthalate metabolites and four phenolic compounds, bisphenol A, 2,5-dichlorophenol, benzophenone-3 and triclosan. When children were between 7 and 9 years of age, mothers (n = 153) completed the Social Responsiveness Scale (SRS), a questionnaire designed to identify characteristics of ASD, including problems with interpersonal behavior, communication, and repetitive/stereotypic behaviors. The SRS is validated as a screening tool for use in the general population.
RESULTS: In adjusted generalized linear models, increased low molecular weight phthalate metabolite concentrations were associated with poorer SRS scores (B = 1.53, 95% CI 0.26-2.80, p-value: 0.02). SRS treatment subscale scores were also significantly poorer for Cognition (B = 1.43, p = .03); Communication (B = 1.80, p = .01); and Awareness (B = 1.29, p = .03), but not for Mannerisms or Motivation. There were no significant associations for high molecular weight phthalates or phenols, which have lower exposure levels.
CONCLUSIONS: Prenatal phthalate exposure was associated with social impairment in a healthy, urban population. Our findings are not limited to autistic spectrum disorders but may encompass multiple, overlapping developmental disorders in which social impairment is a salient feature. These results extend our previous finding of abnormalities in neonatal behavior and later childhood behaviors in relation to prenatal phthalate exposure.

141 House Officer

4:30 PM

Additional Forms of Victimization in Children Exposed to Violence

Ruth Rubio, Paola Carugno, Rosemarie DiDonato, David H. Rubin.
Pediatrics, St. Barnabas Hospital, Bronx, NY; Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Recent studies have documented increasing rates of direct & indirect victimization of children nationwide. The Child Advocacy Center of St. Barnabas Hospital is implementing the Safe Start Initiative Program designed to promote the development & application of evidence-based practices for children exposed to violence. The Program serves children aged 0-7 years exposed to domestic violence (DV) or community violence (CV).
OBJECTIVE: To identify characteristics & exposure to other forms of victimization in children with known exposures to domestic or community violence.
DESIGN/METHODS: Baseline data from the Juvenile Victimization Questionnaire-Caregiver version (JVQ-B) were gathered from families as they enrolled in the Safe Start Program. Information included demographic data & the results of the JVQ-B which measures childhood victimization in 5 domains: conventional crime, child maltreatment, peer/sibling victimization, sexual victimization & witnessing violence/indirect victimization.
RESULTS: 135 patients enrolled in the Program [(89 males (69%), 113 Hispanics (84%)]. 28 (21%) were < 2 yrs of age, 58 (44%) were 3-4 yrs of age, and 47(35%) were 5 to 7 years old. At the time of initial exposure to violence, 92 (70.2%) of the children were < 2 yrs of age, and at the time of enrollment in the project, 107 (79%) were > 2 yrs of age. By age 5, 80% were already exposed to multiple forms of victimization. Boys (70%) were more likely to witness DV than girls and were also more frequently physically abused than girls. Most girls who were sexually abused were abused by a known perpetrator. Children who witness DV were more likely to witness CV without a weapon. Increased frequency of exposure to DV was significantly associated with other forms of victimization: witnessing violence against a sibling, frequency of exposure to CV with and without a weapon, custody fights and hearing gun shots/bombs/witnessing street riots. Frequency of exposure to DV was not associated with murder of somebody close to the child, neglect and sexual/verbal abuse.

CONCLUSIONS: In children exposed to violence, initial exposure to DV and CV occurs early in life. These children are not identified until they are much older and have been exposed to other forms of victimization. More boys witness violence at home and suffer from physical abuse while older girls are victims of sexual abuse. Many of these children may be born into homes where DV and CV are already present or begin shortly after birth.

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Is Neurocognitive Function Associated with Youth Gambling Trajectories?

Caitlin A. Brown, Hallam Hurt, Nancy L. Brodsky, Laura M. Betancourt, Kathleen A. McKenna, Joan M. Giannetta, Daniel Romer.

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BACKGROUND: Studies have examined the relations among patterns of youth gambling, impulsivity, sensation seeking, family demographics, and comorbid problems. Few youth gambling studies have assessed neurocognitive function (NCF).

OBJECTIVE: Identify trajectories of youth gambling; evaluate risk factors for youth gambling, in particular NCF; and identify comorbid problems.

DESIGN/METHODS: Youth aged 10-12 years of mixed SES (n=387) were enrolled from Philadelphia schools. Three annual evaluations included: 1) self-reported risk behaviors; 2) NCF (8 tasks assessing 3 systems: Working Memory, Cognitive Control, and Reward Processing); 3) Impulsivity (Eysenck I_7 Junior Impulsivity Subscale); 4) Sensation Seeking (Reduced Brief Sensation Seeking Scale); 5) problem behaviors (ASEBA-YSR); and 6) family demographics. Our primary outcome was self-report of gambling for money. Trajectory group membership for gambling was derived using methods developed by Nagin *et al*. Risk factors were evaluated using backward multivariable logistic regression including relevant covariates with $p \leq 0.10$ in preliminary bivariate analyses. Comorbid problems were identified by Chi-Square analysis.

RESULTS: Two Gambling trajectory groups were identified: Early Gamblers (EG) (n=111) who initiated at ages 10-12 and continued in later assessments, and Later Gamblers (LG) (n=276) who initiated at a later age and gambled less. Betting money on cards and sports were the most frequently reported gambling behaviors. Using Gambling group (EG or LG) as the outcome, the final regression model for risk factors showed that EG are more likely male (p=0.001), report more active coping strategies (p=0.051), engage in Sensation Seeking (p=0.013) and Impulsive (p=0.014) behaviors, and have friends who gamble (p=0.001). NCF, however, did not differ between EG and LG. Additional factors not related to outcome were: parental monitoring and marital status, SES, race. In regard to comorbid problems, EG were more likely in the Borderline or Clinical range for YSR Externalizing and/or Internalizing and to engage in early drug use (all $p \leq 0.006$).

CONCLUSIONS: In this cohort we identified two gambling trajectory groups.While EG were more likely to engage in Sensation Seeking and Impulsive behaviors, and exhibit more comorbid problems, EG did not differ from LG in NCF. We speculate that NCF may emerge as a relevant factor in problem gambling at later ages.

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House Officer

5:00 PM

On-Line Survey of Feeding and Gastrointestinal Problems in Children with High Functioning Autism: Comparison with Their Normally Developing Siblings

Vahe Badalyan, Richard H. Schwartz.

Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA.

BACKGROUND: Children with autism have a high prevalence of feeding and gastrointestinal problems. Few studies have been done to identify the extent of these problems in high-functioning autistic children.

OBJECTIVE: To compare the prevalence of feeding difficulties and gastrointestinal disorders in children with autism and their normally developing siblings.

DESIGN/METHODS: A 41-item anonymous structured survey on development, attainment of milestones, feeding behavior, meal preferences, and gastrointestinal problems in both the child with autism and his/her sibling was posted as a secure online questionnaire at www.formsite.com (Vroman Systems, Inc., Chicago, IL). The link to the survey was sent to autism support groups in Northern America. Respondents were mainly from United States (77%) and Canada (17%). We received a total of 228 questionnaires containing information on 156 children with Asperger syndrome and 70 children with PDD. Mean age was 12, 7.6, and 10.8 years for Asperger, PDD, and control groups, respectively. 84% of autistic children and 51% of the control group were males.

RESULTS: Compared to their controls, children with Asperger and PDD had higher prevalence of mealtime behavioral problems at school (26% and 34% vs. 2% of controls), fear/dislike of new food (54% and 63% vs. 11% of controls), preference for specific food colors, shapes, textures (55% and 63% vs. 5% of controls), and pica (25% and 33% vs. 2% of controls), all statistically significant (Chi square p values <0.001). Children with Asperger and PDD had higher prevalence of gastrointestinal problems: vomiting (8% and 4% vs. 2% of controls), constipation (25% and 30% vs. 4%), soiling (19% and 26% vs. 2%), reflux (10% and 13% vs. 4%), abdominal pain (6% and 4% vs. 2%), and inadequate weight gain (23% and 27% vs. 7%), all statistically significant (Chi square p values <0.05). 20% of Asperger group and 28% of PDD group were on at least one restrictive diet, compared to 8% of the controls. Prevalences of eosinophilic esophagitis, celiac disease and other intestinal diseases were similar across three groups. Prevalences of frequent feeding and GI problems were similar in Asperger and PDD groups, except unusual food preferences and dislike of new foods.

CONCLUSIONS: Children with Asperger syndrome or PDD have significantly higher rates of abnormal feeding behaviors and GI problems compared to their normally developing siblings.

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5:15 PM

Accuracy of Pediatricians' Identification of Developmental and Behavioral Problems

Shela Merchant, R. Christopher Sheldrick, Ellen C. Perrin.

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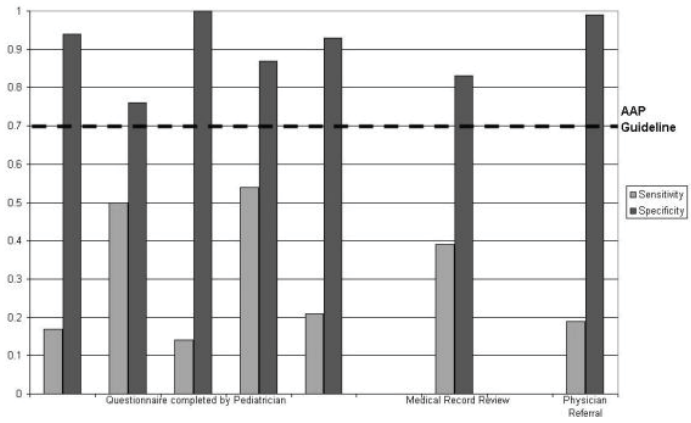
BACKGROUND: Pediatricians are important gatekeepers to mental health services. Many investigators claim that unless they use validated screening instruments, pediatricians are not accurate in identifying developmental or behavioral problems. However, the data to support this claim have not been systematically reviewed.

OBJECTIVE: To determine the accuracy of pediatricians' clinical identification of behavioral and developmental problems in young children, we conducted a systematic literature review based on searches of Medline and bibliographies of relevant articles.

DESIGN/METHODS: We identified 11 studies that included: 1) an assessment of pediatric identification; 2) an independent criterion assessment (e.g., diagnostic interview, validated screening instrument, or qualification for services); and 3) follow-up of a sufficient number of cases to determine sensitivity and specificity. For each study, we calculated relevant statistics and evaluated quality using QUADAS criteria, a standard way to assess study methodology in systematic reviews of diagnostic accuracy.

RESULTS: We compared individual studies to AAP guidelines for screening instruments, which state that sensitivity and specificity should be above 0.70. Two studies were excluded because they focused on a single disorder (sleep problems, language delay), and two additional studies were excluded because data were based solely on parent report of discussions with pediatricians. In each of the remaining 7 studies, sensitivity fell below the AAP threshold and specificity fell above the AAP threshold. Given the high variability in study quality, meta-analytic summary variables could not be calculated.

Figure: Accuracy of pediatricians' identification of developmental and behavioral problems



CONCLUSIONS: These studies suggest that pediatricians identify a relatively low proportion of children who have a developmental or behavioral problem, but they do identify correctly most children who do not have such a problem. Further research is required to calculate a more detailed estimate of pediatricians' accuracy in identifying developmental and behavioral problems.

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5:30 PM

A Needs Assessment of Health Care Professionals for a Violence Prevention Program at St. Christophers Hospital for Children

Mario Cruz, Daniel Taylor, Aakanksha Mehta, Stephen Sandlich.

Department of General Pediatrics, St. Christopher's Hospital for Children, Philadelphia, PA; Drexel University College of Medicine, Philadelphia, PA.

BACKGROUND: The profound effects of Community Violence(CV) on children and adolescents led the American Academy of Pediatrics to recommend screening and intervention for CV by pediatricians; unfortunately few routinely do so. Major barriers include lack of time, training, and perceived futility.

OBJECTIVE: To identify the attitudes and practices of CV screening in pediatric health care professionals at St. Christophers Hospital for Children(SCHC).

DESIGN/METHODS: A survey about CV knowledge, attitudes and practices was administered to pediatric interns, residents, attending physicians, fellows, nurses, and social workers at SCHC. Data was sorted and analyzed by occupation.

RESULTS: While 85% of the surveyed healthcare professionals(n=237) had never been victimized by CV, 82% had treated patients for CV-related injuries. Only 50% of interns had treated patients for CV-related injuries. Most respondents(92%) identified CV as a public health issue. Knowledge of CV was fair; 100% knew of two risk and protective factors for CV victimization but only 46% correctly identified homicide as the major cause of death for Philadelphia teenagers and 38% knew the correct prevalence of adolescent fighting. A striking dichotomy was uncovered about CV screening attitudes and behaviors. Most respondents were supportive of CV screening (83% feel CV screening is within their role, 50% feel comfortable discussing CV with families). Conversely, only 19% routinely asked about bullying, 10% ask about fighting, and 17% ask about guns. Two-thirds of respondents were uncomfortable discussing corporal punishment and only 33% routinely recommend nonviolent disciplinary alternatives. Major barriers to CV screening were institutional deficiencies (space, money, resources) (55%), time(27%) and inadequate training(10%). Most respondents(80%) wanted more training on CV prevention.

CONCLUSIONS: While health-care professionals recognize CV as a public health issue and have attitudes supportive of CV prevention, screening for CV is seldom performed. Major barriers included time, money, resources, and inadequate training. Institutional support should include an onsite CV social worker and improved CV training. Pediatric interns had little experience with CV-victimized patients, suggesting that CV training should begin during medical school.

Poster Session II

Saturday, March 27, 2010
6:00 PM-7:30 PM

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Window Fall Trauma in Children

Alison B. McCrone, Kathleen A. Lillis, Ali Ebrahimi, William Grant.
Department of Emergency Medicine, SUNY Upstate Medical University, Syracuse, NY; Department of Pediatric Emergency Medicine, SUNY at Buffalo School of Medicine and Biomedical Sciences, Buffalo, NY.

BACKGROUND: Over 46,000 children die every year worldwide as a result of injuries sustained from falls from windows.

OBJECTIVE: The objective was to describe the incidence, injuries and conditions which may lead to accidental window falls in children.

DESIGN/METHODS: A retrospective chart review of patients through 21 years presenting to a Level I trauma center for the period 1995 to 2006 with injuries related to an accidental fall from a window. Data were collected on patient demographics, details of the fall, event environment and health outcomes.

RESULTS: A total of 63 patients were identified, 68% were male, 43% were <3 years old, with 83% being 6 years or younger. This risk of falling from a window is increased if the child is less than 6 years of age (OR=2.21, 95%CI 1.16-4.21, P<.02), if the child is male (OR=5.77, 95%CI=2.6-12.7, P<.001), or if it is during a warmer month (May-August) (OR=1.86, 95%CI 0.99-3.4, p<.05). Most (89%) falls were from a second story. Among those evaluated, 87% were admitted for further evaluation, 89% had a head CT scan, and 70% of all patients had abdomen and pelvis CT. Of those admitted, 20% were admitted to the PICU for serious injuries. The most serious injuries were to the head with 16% of patients sustaining a skull fracture and 10% sustaining an intracranial hemorrhage. The most common injuries to the upper and lower extremities were fractures, presenting in 18% and 14% of patients respectively. In 19% of cases, CPS was contacted for further investigation.

CONCLUSIONS: Children who have access to unprotected windows are at an increased risk of suffering injuries due to falling from the window. Males and those 6 years of age and less are at the greatest risk, particularly during the summer months. To develop effective prevention programs, it is necessary to identify risk factors associated with accidental falls.

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Cervical Spine Injuries in Children: A 7-Year Review at St. Barnabas Hospital, Level 1 Trauma Center, Bronx, NY

Sheryl Grace R. Kho, Wipanee Phupakdi.
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BACKGROUND: Pediatric spinal injuries comprise 1-10% of all cases of spinal injury; 60-80% of these injuries affect the cervical spine. Despite its relative rarity, cervical spine injuries result in significant mortality and morbidity. Timely identification and appropriate treatment of such injury is critical for the prevention of further neurologic damage and deformity. Prior studies have reported that characteristics of cervical spine injuries are strongly age-related and differ between infants, children and adolescents.

OBJECTIVE: To determine the incidence, age-related risk factors, and outcome of pediatric cervical spine injury in an urban Level 1 Trauma Center.

DESIGN/METHODS: Medical records of 932 patients seen in the St. Barnabas Hospital Emergency Department, a Level 1 trauma center in Bronx, NY, from June 2002 to June 2009 were reviewed based on their inclusion in the trauma registry; representing all the trauma patients seen during the time period. This also included all Pediatric trauma patients, age 0-18 years. Excluded from the study were those patients with pre-existing, congenital or known spinal injuries. Cases of cervical spine injuries were defined by either clinical or radiologic evidence.

RESULTS: 8 cases of cervical spine injuries were identified with incidence of 8/932 (0.85%). The cases ranged from 23 days old to 17 years of age, with a mean±SD of 6.9±6.5 years with equal sex distribution.

Cervical Spine Injuries in Children

Age/Sex	Mechanism	Diagnosis
11mos/M	Asphyxia from metal chain	SCIWORA
23days/F	Fell from mother's arms	C5 Fracture
4y/F	Jumped from bed	C2 Fracture
9y/F	Fall from swing	SCIWORA C7
1y/F	Fall from bed	Subluxation C3
8y/M	Pedestrian struck	Subluxation C4
17y/M	Gunshot	C2-C3 Fracture
15y/M	Assault with bottle to head, neck	C3 Fracture

SCIWORA-spinal cord injury without radiologic abnormality

CONCLUSIONS: Falls were the most common mechanism of injury in this study. These data differ from prior studies in which motor vehicle accidents were the leading cause of injury. The incidence of cervical spine injuries was consistent with previous studies. While children under 10 were most commonly injured from accidental falls, adolescents were injured by nonaccidental causes. Providing anticipatory guidance on fall prevention and violence exposure in these age groups may reduce the incidence of cervical spine injuries.

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The Tipping Point: Hidden Dangers of the Transition to Digital Television

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BACKGROUND: Televisions are ubiquitous in the American home. Injuries sustained by young children from falling TVs are common. The most common mechanism of toppling involves a child climbing the stand on which the TV is resting and pulling the TV down on top of her or himself. Recent mandatory switches to digital broadcasts have accelerated the transition from traditional cathode ray televisions (CRT) to digital flat panel televisions (FP). No data is available on the danger of toppling of these newer televisions.

OBJECTIVE: To describe the physical characteristics of common CRTs and FPs (weight, size). To compare the forces necessary to reach the tipping point of common sized FPs with those of conventional CRTs.

DESIGN/METHODS: A convenience sample of both types of TVs was analyzed. Standard data sheets from manufacturers were used to record sizes and weights. TVs were placed on stable platforms. A digital scale was attached to the top center of the TV screen. Horizontal force was applied, pulling it forward. The amount of force applied just as the TV began to topple forward was recorded. The two groups were compared using the Mann-Whitney U test. Physical characteristics were reported using descriptive statistics.

RESULTS: Based on consumer data, the most common sized screens were 20" for CRTs and 32" and 40" for FPs. Twenty-two televisions were evaluated. Mean (range) weights were as follows: CRT: 59.4 lbs (48.5-65), 32" FP: 27.4 lbs (24-33); 40" FP:49.6lbs (35.9-68). The mean (SD) force to tip a CRT (n=8) was 9.2 pounds (+/- 2.5); to tip a FP (n=14) was 6.03 pounds (+/-1.45). The force needed to tip a large-screen FP was significantly less than that needed to topple a CRT (p=.002).

CONCLUSIONS: Flat panel televisions are more susceptible to toppling than traditional CRTs when both are placed on a stable surface. Parents with young children should strongly consider alternate methods of securing these new televisions.

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Interrater Reliability of the Clinical Examination in Pediatric Soft Tissue Infections

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BACKGROUND: In recent years, emergency departments have seen a dramatic rise in pediatric soft tissue (ST) infections. Currently, the clinical examination plays a key role in distinguishing a cellulitis, which is treated with antibiotics, from an abscess, which may require drainage. Due to the overlap in clinical signs and symptoms, difficulties exist in differentiating them.

OBJECTIVE: To determine the interrater reliability of the clinical examination by pediatric emergency medicine (PEM) physicians for the presence of a ST infection requiring drainage, and to identify patient characteristics that may be associated with poorer agreement, such as patient age, lesion size, and a history of prior drainage from the lesion.

DESIGN/METHODS: Cross-sectional study of pediatric patients with up to 3 isolated ST infections were evaluated by 2 PEM physicians between 6/08- 10/09. Physicians, blinded to each other's assessment, recorded their level of suspicion for whether the lesion required drainage (drainage indicated, not indicated, or uncertain). The primary outcome measure was agreement as measured by the kappa statistic. Secondary outcomes included agreement given covariates such as patient age, lesion size, and a history of prior drainage from the lesion, evaluated with stratified chi2 analyses.

RESULTS: A total of 376 lesions in 335 patients were evaluated. Mean patient age was 7.8 yrs ± 6 yrs (min 2 mos, max 19 yrs). 65% of lesions were in black patients, and 26% in white pts. 57% of lesions were in females. The majority of lesions were on the leg (30%) or buttock (25%). For 23 lesions, there was missing data from raters regarding their diagnosis. Therefore, a total of 353 lesions were analyzed for reliability. The kappa statistic for whether a lesion required drainage was 0.36 (95% CI: 0.28, 0.44). Physicians were not more likely to agree if lesions had ≥4 cm2 of either induration, fluctuance, or erythema compared with smaller lesions. Similarly, lesions with a history of previous drainage from the lesion were not more likely to be agreed upon. However, lesions in patients ≥4 years were 1.3 times more likely to be agreed upon compared to those <4 years old (95% CI: 1.08, 1.56).

CONCLUSIONS: Reliability among PEM physicians for diagnosing ST lesions requiring drainage is fair. Younger children may be more difficult to evaluate consistently. Evaluation of other, possibly more objective modalities to aid in diagnosis should be undertaken.

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Capnography Improves Recognition of Endotracheal Tube Dislodgement by Prehospital Providers

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BACKGROUND: Dislodgement of endotracheal tubes (ETT) during patient transport is not uncommon. Prehospital providers work in difficult and noisy environments in which intubated patients are routinely being moved and at risk of dislodgement. Capnography monitors patient ventilation and shows immediate changes with ETT dislodgement unlike pulse oximetry and cardiac monitors. However, this equipment is not routinely available to all prehospital providers.

OBJECTIVE: To determine the difference in time to recognition of endotracheal tube dislodgement with or without the use of capnography.

DESIGN/METHODS: Paramedic students participated in a simulated transport of a child during which the ETT becomes dislodged. Students were randomized to view capnography in addition to a standard cardiac monitor and pulse oximetry or view only a cardiac monitor and pulse oximetry. The patient scenario and change in vital signs were identical in both groups aside from capnography. Our primary outcome was recognition and correction of ETT dislodgement which was defined as removal of the ETT, bag-valve mask ventilation provided around the ETT or repositioning of the ETT under direct visualization. If identification of the dislodgement did not occur after 10 minutes, at which point the baby was severely hypoxic and bradycardic, the simulation was ended.
RESULTS: In this ongoing study, thirteen paramedic students were enrolled. Seven students were randomized to the capnography group, 5 (71%) of whom recognized and corrected the ETT dislodgement. Six students were randomized to the standard monitor group, 2 (33%) of whom recognized and corrected the dislodgement. The mean time to recognition was 195 seconds. There were no significant differences between the 2 groups in terms of years of prior prehospital experience (p=0.63) or perceived comfort with capnography (p=0.52).
CONCLUSIONS: There was a significant difference in the rates of recognition of ETT dislodgement with and without capnography. The use of capnography during transport significantly improves the recognition of endotracheal tube dislodgement by prehospital providers.

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Pediatric Residents' Competencies in the Care of Surgical Patients: A Needs Assessment

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BACKGROUND: As the complexity of hospitalized children increases, the role of pediatricians in the care of surgical patients continues to grow. The Pediatric RRC mandates experience in perioperative care, but specific residency competency domains have yet to be defined.
OBJECTIVE: To assess pediatric residents' perceptions of preparedness and need for further training in the care of surgical patients.
DESIGN/METHODS: Pediatric residents at an urban academic medical center were invited to participate in an anonymous on-line survey. Six clinical vignettes were presented highlighting ten perioperative domains: pain management, procedural sedation, respiratory care, fluid and electrolytes, nutrition, rehabilitation assessment, discharge planning, psychosocial needs, patient safety, and multidisciplinary team work. Outcomes were self rating of preparedness and training needs (5-point Likert scale).
RESULTS: Ninety percent of residents (27/30) completed the survey. In the pain management domain, the majority of residents felt very prepared (52-62%) to address uncomplicated postoperative pain, but only 24% felt prepared to manage pain in a child with behavioral problems and anxiety. The majority felt very prepared to address perioperative respiratory care, fluid and electrolytes, and to work in multidisciplinary teams (52-62%). In the areas of nutrition and psychosocial needs, preparedness was variable: most (61%) felt very prepared to manage nutrition in a child with traumatic brain injury but only 19% to address hypoalbuminemia in a spinal fusion patient. In the psychosocial domain, over half felt very prepared to communicate with Child Protective Services (62%) and Child Life (66%) but only 38% to identify when Psychiatry should be consulted. Fewer residents felt very prepared to address the domains of rehabilitation (33%), discharge planning related to durable medical equipment (14%) and procedural sedation (14%). Most residents agreed a formal curriculum in perioperative care would be helpful (80-95%).
CONCLUSIONS: Pediatric residents felt prepared to manage surgical patients, particularly in perioperative domains overlapping with traditional medical care. However, residents expressed the need for more formal curriculum. Residents' perceptions of their preparedness and learning needs may help identify specific competencies to be developed in perioperative care training.

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Pediatric Resident Experiences Coping with Stress during Residency Training

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BACKGROUND: Pediatric residents encounter many stressful events during training, especially in the Neonatal Intensive Care Unit (NICU). Stressors include patient death, ethical dilemmas and time constraints. A death and dying lecture series was started recently, but there is no established program at University of Maryland Medical Center (UMMC) to help residents develop life-long coping skills necessary when caring for critically ill patients in the NICU.
OBJECTIVE: 1) To explore perceptions of coping skills and emotional responses to stressors during pediatric residency training, and 2) to evaluate a pilot program utilizing formal debriefing at the end of the NICU rotation.
DESIGN/METHODS: A descriptive study was performed to evaluate pediatric residents' views of coping skills utilized in residency, experiences surrounding patient death, and exposure to debriefing. After literature review, an anonymous 5-point Likert scale survey was developed. Residents rotating through the NICU at UMMC completed the survey before and after their rotation during 2008-2009. A pilot intervention was performed with 9 residents to explore the effects of formalized debriefing. Descriptive statistics were used to describe survey responses, and comments were analyzed qualitatively for emergence of themes.
RESULTS: 22 pediatric residents rotating in the NICU at UMMC consented to participate. All reported having stressful experiences as a resident, with 64% having stressful experiences in the NICU. 82% experienced a patient death during training (average 4.4 deaths/resident). 18% felt residency has sufficient curriculum regarding self-care or development of emotional resources to deal with patient death. Sadness (77%) and sense of failure (45%) were the predominant affective responses reported following patient death, and were most commonly associated with the need for debriefing. 91% found discussing a stressful event an effective coping skill. 9 residents participated in formal debriefing after the NICU rotation. 78% felt debriefing improved ability to cope with the stresses of the NICU and patient death, and agreed debriefing improved team building and communication.
CONCLUSIONS: It is essential for residents to develop coping skills and emotional resources to care for critically ill patients. These skills should be explored and developed during residency. Debriefing may be an effective tool for dealing with the stresses of caring for sick patients, and allow for improved communication and team building.

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The Perception of Pediatric House Staff and Attendings on the Necessity of Specific Resuscitation Skills

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BACKGROUND: Despite being at the front lines of caring for acutely ill children during their inpatient training, pediatricians are not well prepared for managing pediatric emergencies. The ACGME mandates acquisition of "sufficient training in basic and advanced life support." Aside from the Pediatric Advanced Life Support (PALS) course, there is no uniform structured training in resuscitation. To supplement PALS, many training programs employ simulation of critical situations as a component of the residency curriculum. In order to maximize the effectiveness of resuscitation training, it is crucial to focus on those aspects of resuscitation deemed most important by the pediatric community.
OBJECTIVE: To determine which cardiopulmonary resuscitation skills pediatric residents, fellows, and attendings consider essential for pediatric residents to master prior to graduation.
DESIGN/METHODS: Pediatric residents, fellows, and attendings in a tertiary care children's hospital completed an anonymous questionnaire. Beliefs regarding the importance of proficiency in specific resuscitation skills were obtained. Differences among groups were assessed for significance using the Kruskal-Wallis test.
RESULTS: 91% of residents and 32% of fellows and attendings completed the survey. 77% of fellow/attendings were sub-specialty trained with 35% trained in either intensive care or emergency medicine. The knowledge-based resuscitation skills perceived to be most important by all respondents included knowing when to call for help, obtaining a relevant past medical history, and requesting appropriate medications. The technical skills deemed most important by respondents were performance of chest compressions, bag mask ventilation, and ability to connect the oxygen. Various resuscitation skills were considered more important from a resident perspective than from a fellow/attending perspective, including endotracheal intubation, central line and chest tube placement and ventilator management (p=0.0001), and reading relevant imaging studies without a radiologist, managing arrhythmias and performing a cricothyroidotomy (p<0.007).
CONCLUSIONS: There is consensus between residents and fellow/attendings that the most important aspects of a resuscitation curriculum are basic life support skills. However, there are differences in the perceived importance of graduating with advanced resuscitation skills.

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High Fidelity Simulation Improves Neonatal Procedural Skills and Team Behaviors

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BACKGROUND: Most Neonatal Resuscitation Program (NRP) instructors consider simulation and debriefing an important part of their courses. Yet the measurable benefits of simulation on competence and confidence have been inconsistent across populations.
OBJECTIVE: We hypothesized that a simulation booster 7-10 months following NRP would improve resident retention of resuscitation knowledge, procedural skills and teamwork behavior by 15%.
DESIGN/METHODS: The study design is a randomized, controlled intervention. Residents were recruited from Pediatric (n=32) and Family Medicine (n=26) residency programs which provide disparate clinical exposure to resuscitation. Half of each class were randomized to intervention. All residents had simulation at assessment, 15-18 months post-NRP. Procedure and behaviors were assessed using a scenario-specific tool, and knowledge by pretest. Residents reported on confidence, recent NICU experience, certification and simulation exposure. They evaluated sessions on a 5 point Likert scale. Power analysis (at 80%, alpha 0.05, effect 10%) gave sample size of 46. Intervention versus control was compared at null and 15% effect sizes, then analyzed for institution and modifying variables. Means were tested with Wilcoxon rank sum, inter-rater correlation with pairwise quadratic kappas.
RESULTS: The table shows unadjusted outcomes, p values based on null effect size (15% effect not significant). Modifying variables differed between institutions (certification p<0.005; simulation exposure p<0.04; NICU experience p<0.0001) but not between the intervention and control groups.

Outcomes

	Intervention (n=22)	**Control (n=28)**	**p value**
	Mean ± SD	Mean ± SD	
Procedural	71.6 ± 9.4	64.5 ± 12.2	<0.05
Behavioral	18.8 ± 2.8	16.2 ± 4.1	<0.02
Knowledge	71% ± 11%	69% ± 12%	0.54
Confidence	2.5 ± 0.6	2.2 ± 0.7	0.14
	Residency 1 (n=30)	**Residency 2 (n=20)**	
Procedural	69.8 ± 10.4	64.3 ± 12.6	0.1
Behavioral	18.6 ± 3.4	15.5 ± 3.6	<0.005
Knowledge	72% ± 9%	66% ± 13%	0.09
Confidence	2.5 ± 0.6	2.0 ± 0.7	<0.007

Procedural kappa values ranged from 0.76 ± 0.02 to 0.86 ±0.02 for three evaluators. Behavioral kappa values ranged from 0.31 ± 0.06 to 0.59 ± 0.05. Residents reported the scenarios were high fidelity (4.7±0.6) with high impact on clinical practice (4.7 ± 0.6).
CONCLUSIONS: High fidelity simulation 7-10 months after NRP measurably improves procedural skills and team behaviors.

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Mycoplasma Pneumonia Increases Symptom Severity in Children with Status Asthmaticus

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BACKGROUND: Relationship between Mycoplasma pneumonia (MP) and bronchial asthma (BA) is not clear. Many studies reported association between MP and acute or chronic BA, yet few looked into the role of MP towards the severity of BA.

OBJECTIVE: To evaluate if MP worsen clinical severity of children with status asthmaticus (SA).

DESIGN/METHODS: We prospectively enrolled children from 0 to 18 years of age with established BA that were admitted for SA in two urban community hospital pediatric units from June to November 2009. Serologic tests for MP were performed in all children with SA. Acute MP infection was defined by positive serology specific immunoglobulin M (IgM) anti-MP. Demographic data, pediatric asthma symptom severity (PASS) scores at different interval of hospitalization, vital signs, length of hospital stay (LOS), and laboratory data were collected and compared between children with acute MP infection (MP group) and those without MP infection (non-MP group). PASS score on admission was used to measure clinical severity.

RESULTS: Of 172 enrolled children, 24 were excluded for incomplete data. MP was confirmed in 70 children (47.3 %). Mode age of children with MP and non-MP was 4 years. PASS scores on admission were 4.7 ± 2.2 and 3.7 ± 1.6 for MP and non-MP groups respectively ($p = 0.03$). With treatment, the LOS was 3.2 ± 0.9 and 3.2 ± 1.3 days for MP and non-MP groups respectively ($p = 0.64$).

CONCLUSIONS: MP infection worsens symptom severity and should be sought in children with severe acute asthmatic attack. We should consider empirical antibiotic treatment targeted towards MP infection.

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The Association between Disease Beliefs and Indoor Environmental Control Practices among Children with Asthma

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BACKGROUND: Indoor air allergens play an important role in asthma morbidity. Use of environmental control practices (ECPs) has been shown to improve asthma outcomes and is an important part of asthma management. Health beliefs can be significant predictors of disease management. However, little is known about how health beliefs influence ECP use for asthma.

OBJECTIVE: To examine the association between asthma disease beliefs and ECP use.

DESIGN/METHODS: Parents of children 2-17 years old with asthma in East Harlem were surveyed. Data regarding use of 25 ECPs was obtained. Participants were asked about disease beliefs regarding their child's asthma: susceptibility to environmental triggers, perceived benefit to environmental changes, belief that asthma is a chronic disease, and belief that asthma significantly affects the child's life. Responses were in Lickert scale format, 1-5, with higher numbers indicating stronger agreement. We used the Wilcoxon rank sum test to examine the association between beliefs and ECP use. Multiple logistic regression models were built to control for demographic predictors including race, gender, age, and level of parental education.

RESULTS: We surveyed 129 parents. Mean scores for perceived susceptibility to environment, perceived benefit from environmental changes, belief of chronicity, and effect on life were 0.7, 3.6, 2.0, and 3.1 respectively. Overall, most ECPs were positively associated with higher belief scores, but only some reached statistical significance. Perceived susceptibility was positively associated with wet dusting ($p=0.03$). Those who believed asthma had a significant impact on life were more likely to use a dehumidifier ($p=0.001$), remove mold ($p=0.04$), wash sheets in hot water ($p=0.004$), and wash stuffed toys regularly ($p=0.003$). Belief in chronicity was positively associated with dehumidifier use ($p=0.001$) and washing stuffed toys ($p=0.02$). Increased perception in benefits was negatively associated with exterminator use ($p=0.001$). After controlling for confounders, results remained significant except association between perceived susceptibility and wet dusting as well as chronicity and washing toys.

CONCLUSIONS: Asthma disease beliefs were significantly associated with use of a number of ECPs. Disease beliefs are modifiable and can be targeted in potential interventions to improve asthma management.

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Demonstration of Metered-Dose Inhaler and Spacer with Mouthpiece Administration Technique by Pediatric Asthma Patients

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BACKGROUND: We previously demonstrated that despite compelling data supporting the correct use of spacers (SP) with metered-dose inhalers (MDIs) in patients (pts) with asthma, health care providers (HCPs) at our institution demonstrate the use of MDI/SP incorrectly. We hypothesized this would lead to incorrect use of MDI/SP by our asthma pts resulting in decreased aerosolized medication delivery with adverse outcomes. We predicted that pts referred by HCPs to our pulmonologist (PVE) would demonstrate incorrect use of MDI/SP and would improve significantly with adequate teaching.

OBJECTIVE: To compare the demonstration of MDI/SP with mouthpiece (MDI/SP-mp) administration technique by pts referred to our pulmonology clinics pre and post education on the correct technique of MDI/SP-mp use.

DESIGN/METHODS: 20 pts, 6-17 yr, who were prescribed MDI/SP-mp by our HCPs and referred to our pulmonology clinics, were observed while using MDI/SP-mp during their first visit. They self-administered (or parent to child) 2 puffs of the MDI they brought to clinic with SP. Their performance was analyzed by assigning 1 point for each correct step in the use of MDI/SP-mp to obtain a demonstration score (DS), using the Inhaler-Use checklist (IUC), 10 steps thought to be key in the use of MDI/SP, for a maximum score of 10. Education on the use of MDI-SP-mp was instituted and performance was documented on each subsequent visit. Differences between pre and post education DSs were assessed using t-test software.

RESULTS: Differences in pre and post-education mean DSs were highly significant 2.6 ± 1.2 and 7.3 ± 1.9 respectively ($p < 0.001$). Pre-education, 0% pts were able to demonstrate all steps correctly, & 0% had a score above 4 vs. 25% and 90%, respectively, post-education. Pre-education, for the 4 most crucial steps in the IUC, 0% pts correctly demonstrated all these steps vs. 25% post-education.

CONCLUSIONS: Pediatric asthma pts in our institution incorrectly demonstrate MDI/SP-mp administration technique, which reflects erroneous teaching by our HCPs. DSs improve dramatically with teaching of correct technique. Long-term education of both HCPs and pts is needed to ensure the correct use of MDI-SP-mp to achieve modulation of lung disease.

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Novel Mutation in the SKT10 Gene Causing a Clinical Syndrome Associated with Juvenile Polyps and Tubular Adenoma

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BACKGROUND: Mutations in the STK11 gene have been identified as a major cause of Peutz-Jeghers Syndrome. Peutz-Jeghers Syndrome is an autosomal dominant disorder characterized by hamartomatous gastrointestinal polyps and mucocutaneous pigmentation. STK11 gene belongs to a family of serine/threonine kinases. The STK-10 gene is a member of this family but has never been associated with human disease. We report a deletion of the STK10 gene in a 10 year old boy which is associated with gastrointestinal juvenile polyps and tubular adenomas.

OBJECTIVE: To demonstrate for the first time that a mutation in the STK10 gene is associated with a clinical disorder similar to a disorder caused by mutations in the STK11 gene.

DESIGN/METHODS: Endoscopy was used to obtain surgical specimens for pathological examination. Chromosome microarray was used to look for any microdeletions. Sequencing and Deletion/Duplication studies of the SMAD4 (Juvenile Polyposis) gene were also performed.

RESULTS: Pathologic examination revealed tubular adenoma of the cecum and juvenile polyps in the proximal descending colon. Chromosome microarray identified a deletion of 5q35.1, approximately 103.6 Kb in size. This deletion is within the gene STK10. No deleterious mutations were detected in the SMAD4 Gene.

CONCLUSIONS: Although not currently associated with disease in humans, this gene is related to the gene STK11, which is mutated in the autosomal dominant Peutz-Jeghers syndrome. This is the first time that a defect in the STK10 gene has been reported in association with clinical pathology of the gastrointestinal tract.

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An Association of Vitamin D Deficiency and Anemia in the Pediatric Population

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BACKGROUND: Very high rates of deficiency of Vitamin D have been reported in the pediatric population in the United Satates(US)[1] The deficiency has been implicated in various diseases such as diabetes mellitus, hypertension, cardiovascular disease, and cancer. Vitamin D deficiency has been implicated in hematological abnormalities and immune system deficiencies[2]. 1. Kumar J, Munter P, Kaskel FJ, Hailpern SM, Melamed ML. Prevalence and Associations of 25-Hyroxyvitamin D Deficiency in US Children: NHANES 2001-2004. Pediatrics. 2009. Epub ahead of print. 2. Simm JJ, Lac PT, Liu IL, Meguerditchian SO, Kumar VA, Kujubu DA, Rasgon SA. Vitamin D deficiency and anemia: a cross sectional study. Ann Hematol. 2009.

OBJECTIVE: To determine if Vitamin D deficiency is associated with anemia.

DESIGN/METHODS: To analyze data from the National Health and Nutrition Examination Survey (NHANES 2003-4) to determine if there is an association between Vitamin D deficiency and anemia. The survey consists of demographic, physical characteristics and laboratory values of a randomly selected non institutionalized civilian US population. The lab value " LBXVID<25ng/ml " was used to assess the presence of low vitamin D. The presence of anemia was assessed by the question " MCQ053-Taking treatment for anemia for the past 3 months". The analysis was done using statistical software SAS version 9.1 PROC SURVEY methods.

RESULTS: 5,289 participants were in the pediatric age group. 4,334 of them were used for the analysis. 955 were excluded because they were missing information for vitamin D and anemia. Vitamin D deficiency was more common in children with anemia with an odds ratio of 2.161 (1.404-3.327). Even after adjusting for age, gender and race the association remained significant with an odds ratio of 2.152 (1.406-3.296).

CONCLUSIONS: 1. Our results suggest a statistically significant association between Vitamin D deficiency and the incidence of anemia in children. 2. The possible role of Vitamin D deficiency as a causitive factor for anemia maybe multifactorial and related to impaired hydroxylation, loss of anti-inflammatory properties or low calcium levels. 3. More and larger studies need to be done to better define the association of Vitamin D deficiency and anemia.

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Quantity or Quality: What Controls the Decision To Pause/Stop a NICU Bottle Feeding?

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BACKGROUND: Neonatal clinicians' standards for bottle feeding safeguard infants' physiologic stability and support organized, self-regulated feeding skills. Goals are to advance feedings in number and volume to achieve full feedings with steady weight gain for timely discharge.

OBJECTIVE: To determine whether quality or quantity has greater priority in NICU bottle feeding.

DESIGN/METHODS: Two large academic hospitals participated. A standardized infant behavior checklist (NIDCAP) was modified to include 24 feeding behaviors. Infant behaviors and nurses' stated reasons for pausing/stopping a feeding were recorded by trained, reliable observers. Parents and nurses gave consent and were aware of study objectives. Inclusion criteria were 24 to 31 weeks post menstrual age (PMA) at birth and no anomalies or neurological problems affecting feeding. Feedings as usual on the infant's own schedule were observed from first bottle feeding to discharge depending on observer and infant availability.

RESULTS: Twenty-six infants contributed data from 118 feedings. The mean PMA across feedings was 36.9 ±2.6 SD weeks with PMA range 32.3 to 47.7 weeks.

Frequency of RN Reasons for Pausing a Bottle Feeding and of Same Items Observed

Rank Order	Reason / Behavior	Frequency RN Report	Frequency Observed
1	inefficient suck	15	26
2	break nipple seal	10	32
3	dripping around nipple	9	38
4	push nipple out	8	7
5	♦ choking	7	8
6	♦ > 8 swallows w/o breath	7	76
7	♦ O2 saturation low	7	16
8	♦ HR > 20% above typical	7	25
9	gulping (flow too fast)	5	21
10	stopped sucking	5	17

Each reason/behavior scored once per feeding segment regardless of number of occurrances. ♦ = physiologic instability

Nurses' top four reasons for pausing/stopping concerned inefficient feeding behavior even though 3 out of 4 unstable physiologic conditions were observed more often. Multiple swallows without breathing (i.e., apneas while feeding) were observed 10 times more often than cited as a reason to pause/stop. Overall, physiologic and behavioral indicators of stress were observed 3 to 10 times more frequently than cited as reasons to pause/stop and increased after the first pause.

CONCLUSIONS: Feeding decisions gave higher priority to efficiency and volume than to behavioral organization and physiologic stability. Clinicians' concerns about feeding quantity may have unintended deleterious consequences for feeding quality.

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Fellow in Training

Superior Mesenteric Artery Blood Flow Velocity: Relationship to Increasing Gestational and Post-Natal Age

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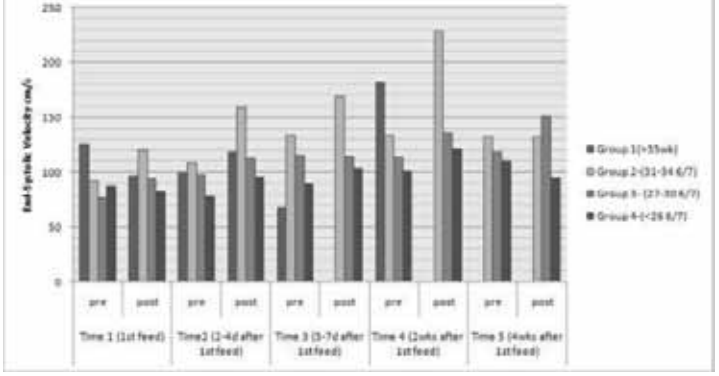
BACKGROUND: Data suggest that mesenteric blood flow stabilizes in newborns after two weeks of life and this is associated with tolerance of enteral feeding. Data on preterm infants, especially those less than 28 weeks gestational age (GA) is limited.

OBJECTIVE: To determine the normal ranges of the superior mesenteric artery (SMA) blood flow velocity (BFV) in relation to GA (4 groups), postnatal age, and pre versus post feed status. We sought to correlate SMA BFV in response to feeds, examine the relationship with GA-specific BFV averages and the occurence of feeding intolerance.

DESIGN/METHODS: SMA BFV and other clinical parameters were assessed at the first enteral feed and scheduled intervals till discharge or death. Measurements occurred at 15 min pre-feed, 30 and/or 60 min post-feed. NIRS will be used to gather information on intestinal tissue oxygenation in Group I patients (controls) for correlation with ESV.

RESULTS: Thirty three neonates were studied: Group I N=2, Group II N= 11, Group III N= 11, Group IV N= 9. Mean ESV for each GA group was plotted against pre/post feed status and time.



A general linear model was used to examine the relationship between mean ESV, GA group, pre/post feed status and time from 1st enteral feed. Adjustments were made for multiple comparisons. We found time from first enteral feed to be significant, p=0.03. Differences in pre to post feed ESV were not significant between GA groups, p=0.18.

CONCLUSIONS: With our limited sample size, only time from 1st enteral feed explained changes in ESV in each GA group. There was no significant difference between group, pre vs post feeds, though there was a positive trend. At study completion, (N=50) we will use logistic regression to determine the impact of GA-group specific mean SMA BFV, on the likelihood of intolerance to feeds.

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Fellow in Training

Meconium Interferes with NIRS Measurements of the GI Tract in Premature Neonates

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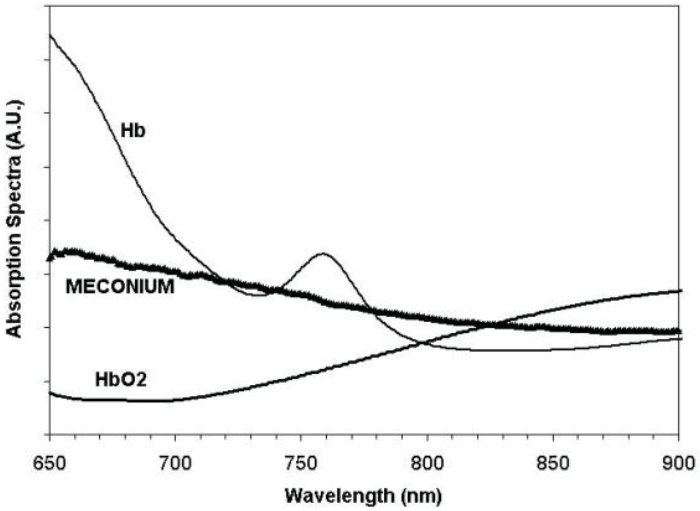
BACKGROUND: Near Infrared Spectroscopy (NIRS) has been successfully used as a monitor of brain oxygenation in neonates. There is increasing research and clinical interest in using NIRS to monitor gastro-intestinal (GI) tissue oxygen saturation (StO_2), particularly for premature neonates.

OBJECTIVE: We initiated a study to compare NIRS GI StO_2 with doppler measurements of superior mesenteric artery flow in neonatal patients. During the study, we found that the GI StO_2 measurements dramatically decreased or disappeared sporadically during the same evaluation period, in the same patient, leading us to investigate possible causes.

DESIGN/METHODS: A meconium sample was obtained and a portion was analyzed by a bench top spectrometer (EPP2000, Stellar Net, Inc, Tampa, FL USA). The remaining meconium sample was then placed in a clear plastic bag and thinned out to form a semi-translucent film. Two commercially available NIRS monitors, FORE-SIGHT (CASMED, Branford, CT USA) and INVOS 5100C (Somanetics, Troy, MI USA) were tested with the sensors placed on an adult forearm to obtain a baseline reading. The meconium film was then inserted between the sensors and the forearm to detect possible changes in NIRS values measured.

RESULTS: The light absorption spectrum of the meconium was plotted along with oxy-hemoglobin (HbO_2) and deoxy-hemoglobin (Hb) for NIRS wavelengths 650-900 nm.



The meconium absorption spectra decreases with increasing wavelength in the NIRS range. When testing the semi-transparent meconium film on the forearm with both FORE-SIGHT and INVOS monitors, the measured StO_2 dropped significantly to either very low or no values, as a function of meconium film thickness.

CONCLUSIONS: The tests performed using meconium samples from a preterm infant in both a spectrometer and the available NIRS monitors demonstrated that meconium can interfere with NIRS StO_2 measurement, resulting in falsely low values. Caution is warranted in interpreting GI StO2 NIRS results in neonates still passing meconium stools.

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Lack of Correlation of Nutritional Outcomes at 1 Year of Age with Bronchopulmonary Dysplasia (BPD) Severity in Premature Infants

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BACKGROUND: In June 2000, the NICHD and NHLBI proposed a severity-based definition of BPD for infants <32 weeks' gestational age (GA). Validation of this definition for respiratory and neurodevelopmental outcomes has been performed, but the correlation of severity of BPD with outpatient nutritional outcomes has not been described.

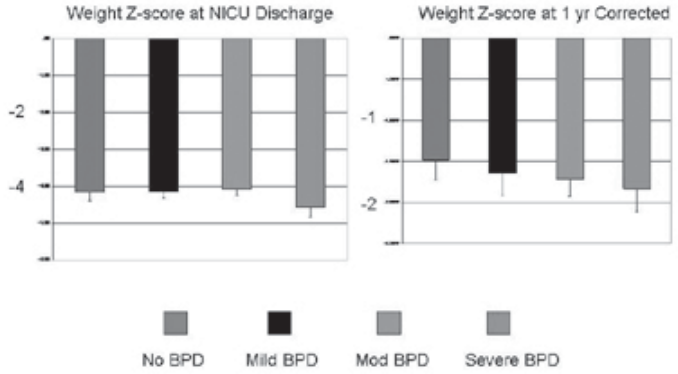
OBJECTIVE: The objective of this study is to determine whether severity of BPD correlates with nutritional outcomes at 12 months corrected gestational age (CGA).

DESIGN/METHODS: The population included a cohort of 423 ELBW infants followed in the Center for Healthy Infant Lung Development or the Infant Follow-up Program at Children's Hospital Boston. The current study was a retrospective analysis of data on growth outcomes in an existing longitudinal database.

RESULTS: Over 35% of our patients had moderate or severe BPD by the NHLBI criteria. (Table 1), and approximately 30% were discharged home on oxygen.

Demographics	
Female (n, %)	184, 43.5%
Gestational Age (weeks) (Mean ± St. Dev, Range)	27.4 ± 2.25, 23-31.9
No BPD (n, %)	117, 27.7%
Mild BPD (n, %)	85, 20.1%
Moderate BPD (n, %)	151, 35.7%
Severe BPD (n, %)	57, 13.4%
Unknown (n,%)	13, 3.1%

At time of NICU discharge, infants with all levels of BPD severity had similar, low weight Z-scores. At one year CGA, infants from all groups showed substantial improvement, with mean Z-scores that were within 2 standard deviations from the term mean. (Figure 1)



Although there was a small trend of correlation with severity of BPD, differences between groups were not statistically significant.

CONCLUSIONS: Severity of BPD, as defined by the NHLBI criteria, did not seem to correlate with weight Z-score at 1 year CGA. Even children with severe BPD achieve good catch-up growth by this time point.

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Non-Invasive Arm Anthropometry Accurately Estimates Body Composition in Low Birth Weight Infants (Birth Weight <2500g, LBW)

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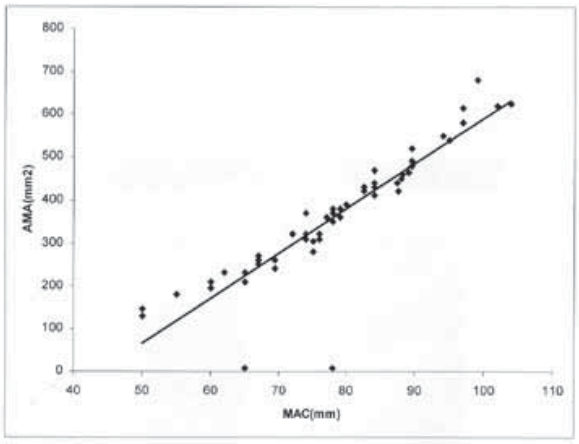
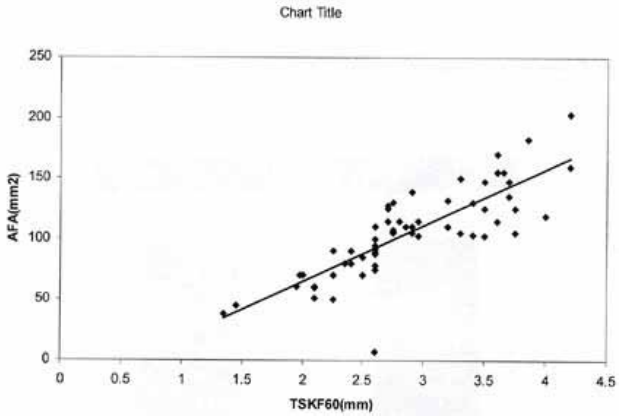
BACKGROUND: Assessment of nutrients accretion/ nutritional status in sick LBW neonates is critical but technically difficult to accomplish. LBW infants tend to retain body fluids which may lead to PDA, NEC and BPD & complicate their nutritional status assessment & fluid/nutrients therapy.

OBJECTIVE: To evaluate a non-invasive bedside method for assessing nutritional status in LBW neonates.

DESIGN/METHODS: Mid-arm circumference (MAC,mm) & tricuspid skinfold thickness (TSKF,mm) were measured by Harpenden's caliper at 15 (TSKF15) & 60 (TSKF 60) seconds of application on days of life 10 & 21 in physiologically stable LBW (modified physiological stability index, Georgieff 1989). Arm anthropometry was calculated as follows (Sann 1988) Arm Area (AA,mm^2) = MAC^2 /4π Arm Muscle Area (AMA,mm^2) = [MAC-π$TSKF15]^2$ / 4π Arm fat area (AFA,mm^2) = AA-[MAC-π$TSKF60]^2$ / 4π Arm Water Area (AWA,mm^2) = AA-[AMA-AFA].

RESULTS: n =34, female=60%, black-90%.





1)AFA and AMA correlated with body weight (AFA=6.488+0.06X weight, r=.8, p< 0.00001, AMA=0.235X body weight -29.67, r= .7, p<.001). 2) AWA correlated with ΔTSKF [AWA= 16.58X ΔTSKF+10.3, r=.6, p<.0001], AMA with MAC [AMA=7.9X MAC-252.9, r=.86, p < .0001] & AFA with TSKF60 [AFA=48.9X TSKF60-34.6, r=.85, p< .0001] Our values are consistent with those measured via Dual energy X ray absortiometry.

CONCLUSIONS: In LBW infants 1)AMA and AFA can be predicted by body weight. 2)AMA, AFA and AWA can be estimated by MAC and TSKF measurements for their nutritional status evaluation.

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House Officer

Neonatal Nursing Perceptions of Breastfeeding Support in the NICU

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BACKGROUND: The AAP Section on Breastfeeding emphasizes the benefits of human milk feeding for preterm infants and the importance of maternal support and education in the hospital setting. However, there are barriers to both initiation of breast milk expression in the hospital environment and continued breastfeeding following discharge. Some of these barriers include insufficient maternal education regarding the importance of breast milk, lack of maternal guidance and education during the infant's hospitalization, and the effect of stress and other factors on the mother's milk supply. Despite attempts to encourage breastfeeding with lactation support by neonatal nurses and lactation specialists, establishment of consistent breastfeeding of preterm infants at The University of Maryland Medical Center (UMMC) has been unsuccessful. From June 2006 to June 2008, only 25% (269/1109) of all infants were receiving human milk feedings at the time of discharge.

OBJECTIVE: Concerned with the low number of infants receiving breastmilk at time of discharge, we surveyed the neonatal nurses to gain insight into practices regarding initiating human milk feedings in the NICU.

DESIGN/METHODS: A 12-question survey with a 5 point lickert scale was distributed to all neonatal nursing staff. Means and standard deviations were calculated for each question.

RESULTS: Initial results indicated belief that the staff provides moms with information and encouragement to initiate human milk feeding (M = 4.41 sd = 0.54). However, fewer nurses endorsed statements regarding knowing the contraindications to breastfeeding (M = 3.25 sd = 0.94) and that the lactation consultant saw new moms within 48 hours (M = 3.09 st 0.93). Nurses endorsed variation in support provided by the residents (M = 3.26 sd =0.79), attendings (M = 3.57 sd =0.89), nurses (M = 4.24 sd = 0.68), and nurse practitioners (M = 4.05 sd = 0.72).

CONCLUSIONS: Although overall the neonatal nursing staff felt that the NICU supported human milk feedings, fewer nurses were comfortable with the contraindications to breastfeeding, and fewer felt that the lactation consultant was able to see moms within 48 hour or that all staff was equally supportive of new mom's proving human milk feedings. Armed with these concerns, we have developed a breastmilk checklist that may address some of these concern. We will redistribute the survey following implementation of the checklist to look at change in nursing perceptions.

166

Treatment of Asymptomatic Full Term Newborns for Presumptive Early Sepsis

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BACKGROUND: Asymptomatic newborns frequently treated with antibiotics for presumptive maternal chorioamnionitis or maternal fever during labor. Recommendations for duration of treatment vary from 72 hours to 5 days of negative blood culture based on non instrument manual methods. Newer technology and improved culture media have been integrated into blood culture systems that reduce the time to detection of positive blood culture results.

OBJECTIVE: Find the average length of time for detection positive blood culture in newborns and decide if 48 hours of treatment is sufficient for asymptomatic infants with suspected sepsis.

DESIGN/METHODS: Retrospective chart review. Blood culture was processed using a computer-assisted, automated blood culture system, ESP (Trek Diagnostic Systems, Inc, Westlake, OH) and neonatologist was notified about positive result before complete identification of microorganism that followed later.

RESULTS: From 2006 to September 2009 106 babies born in the Elmhurst Hospital Center had positive blood culture. 48 (45.2%) infants were full term and 58 (54.8%) – preterm. 46 (43.4%) – had early onset of sepsis and 60 (56.6%) – late onset of sepsis. Median time for detection of positive blood culture in infants with early sepsis was 22 hours (range: 6 – 34), for late sepsis – 28

(range: 18 – 46). Median time of growth for Group B streptococcus was 18 hours (range: 12-21) ; for *Escherichia coli* -22(range: 6-24); for *Staphylococcus aureus* 24 (range:18-34); for *Listeria monocytogenes* - 26 (range: 25-33); for *Candida albicans* – 26 (range: 24- 31); for *Staphylococcus epidermidis*: 31 (range: 23 – 46); for Viridans *Streptococcus:* 29 (range: 21 – 44); for *Klebsiella pneumonia* – 23 (range: 18 – 28); for *Enterococcus faecalis* – 29 (range: 24 – 33). Based on our data we limited treatment of asymptomatic full term newborns to median time 39hours (range: 36 -48). Blood cultures continued to be monitored until final result. Mean length of the treatment decreased from 3.8 ± 2.1 (95%CI: 3.55 – 4.04) to 2.3 ± 1.1 (95% CI: 2.12 – 2.40) days. Estimated difference was 1.5 days (95% CI: 1.1 – 1.8).

CONCLUSIONS: Positive blood culture in newborns with early and late sepsis can be detected in less than 48 hours. Treatment of asymptomatic full term infants can be reduced to 36 hours.

167 Medical Student

Birth Hyperoxia Alters Lung Levels of T-Lymphocytes in Gram-Negative-Infected Sprague-Dawley Rat Pups

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BACKGROUND: Hyperoxia causes excessive oxidant stress, inflammation, lung destruction and leads to simplified alveolarization, apoptosis and disrupted vascularization, leading to chronic lung disease. Gram-negative infection similarly increases lung inflammation, leading to fibrosis and lung remodeling. Recognition of gram-negative infection in the lung is mediated by the CD14-Toll-Like Receptor 4 complex, which has been shown to be hyperoxia-sensitive.

OBJECTIVE: To determine the effect of hyperoxia on the long-term levels of CD3, CD4, CD8, CD14 and CD45 T-lymphocytes in the lungs of Sprague Dawley rats with concomitant gram-negative infection.

DESIGN/METHODS: Four litters of time-pregnant Sprague-Dawley rats were exposed to room air or 100% hyperoxia for 24 hours with intraperitoneal injections of either saline or lipo-polysaccaride (LPS). Immediately after hyperoxia, lungs were harvested and immuno-histochemistry was performed on frozen sections to assay for levels of CD3, CD4, CD8, CD14 and CD45. Pixel count was used for quantification and 20 microscopic images per antibody were obtained. One way ANOVA testing with Bonferroni Correction using GraphPad software were used to determine significance.

RESULTS: CD3 and CD4 levels were significantly lower in the Room-air -LPS, Hyperoxia-saline and Hyperoxia-LPS groups compared with control ($p<0.0001$). Compared with the Room-air-saline group, CD8 levels were lower in the Hyperoxia-saline group ($p<0.0001$). CD14 levels were increased in Hyperoxia-saline group compared to all other groups ($p<0.0013$). The Room-air-saline group demonstrated higher CD45 levels than the three remaining groups ($p<0.0017$).

CONCLUSIONS: Hyperoxia effects T-cell subsets in the lungs to levels associated with gram-negative infection. However, hyperoxia and gram-negative infection are not synergistic in altering T-cell populations within the lung, nor do they parallel CD14 levels, suggesting hyperoxia-induced alterations of T-cells are not solely regulated by TLR4. Further investigation into the role in hyperoxia on T-lymphocyte activation and recruitment may provide important information on the pathogenesis of infections in the hyperoxia-exposed infant.

168 Medical Student

Duration of Maternal Human Papillomavirus Infection and Risk of Spontaneous Preterm Birth

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BACKGROUND: Viral infections, such as HIV, are associated with an increased risk of preterm birth. The exact mechanism between viral infection and preterm birth is unclear but the phase of infection may be an important determinant of pregnancy outcome. Longer duration of human papilloma virus (HPV) infection is associated with higher grade cervical lesions.

OBJECTIVE: We sought to determine the association between duration of HPV infection and the risk of spontaneous preterm birth (SPTB) using cervical cytology and colposcopy as surrogates for duration of infection.

DESIGN/METHODS: Retrospective cohort study of women referred to colposcopy for evaluation of abnormal cervical cytology during pregnancy from 2004-2008 at an urban university clinic. Shorter duration of infection was defined as atypical squamous cells of undetermined significance and high risk HPV+ (ASCUS-HR+) or low grade squamous intraepithelial lesions (LSIL) on a pap smear or a colposcopic impression of cervical intraepithelial neoplasia grade1 (CIN1). Longer duration of infection was defined as high grade (HSIL) or atypical squamous cells favors high grade (ASC-H) on a pap smear or colposcopic impression of CIN grade 2 or 3. The primary outcome was the incidence of SPTB <37 weeks. The incidence of SPTB was also compared between women with and without a history of abnormal pap smears.

RESULTS: We identified 176 pregnant women referred for colposcopy. Mean age was 24 years (14-41), 77% were African American, 13% had prior PTB, and 18% used tobacco. Pap smear results were ASCUS-HR+/LSIL 91% (n=161) and HSIL/ASC-H 9% (n=15). Colposcopic impression was Normal, CIN1, and CIN2/3 in 11% (n=19), 76% (n=132), and 13% (n=22) respectively. Overall, 27 (15%) of 176 women delivered prematurely including 7 indicated PTB and 20 SPTB. There was no significant difference in the incidence of SPTB based on pap smear results (20 ASCUS-HR+/LSIL [12%] vs 0 HSIL/ASC-H [0%]; p=0.30) or colposcopic impression (18 CIN1 [13%] vs 0 CIN2/3 [0%]; p=0.10). History of abnormal pap smears 36% (n=59) was not predictive of SPTB (14% vs 10%; p=0.54).

CONCLUSIONS: Duration of HPV infection was not a significant risk factor for SPTB, however a larger sample size may be necessary to show a difference.

169 Fellow in Training

Can the Ribosomal RNA (rRNA) Gene PCR Improve the Diagnosis of Bacterial Meningitis in Children? A Systematic Review

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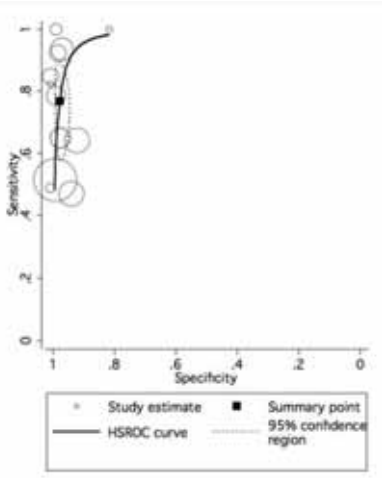
BACKGROUND: Early diagnosis of bacterial meningitis is crucial to improve outcome. Interpretation of CSF culture results is often problematic, particularly in the setting of antibiotic pretreatment. Broad range 16S rRNA gene polymerase chain reaction (PCR) tests do not require the presence of viable bacteria, and may have the potential to improve diagnostic accuracy.

OBJECTIVE: To systematically review the accuracy of the 16S rRNA gene PCR for the diagnosis of bacterial meningitis in children.

DESIGN/METHODS: MEDLINE, EMBASE and Cochrane library databases were searched for keywords "polymerase chain reaction", "RNA, ribosomal, 16S" and "bacterial meningitis". Studies in English, involving humans, using 16S PCR were included. Bacterial meningitis was defined both by positive cultures and clinical criteria. Studies were assessed by two reviewers, and a third arbitrated cases of disagreement. Pooled estimates of sensitivity, specificity, likelihood ratios and diagnostic odds ratio were calculated.

RESULTS: Pooled statistics for 13/249 studies that met inclusion criteria are shown in table and figure below.

Sensitivity	0.77 (0.64-0.86)
Specificity	0.97 (0.95-0.98)
LR+	25.9 (15.1-44.7)
LR-	0.24 (0.15-0.39)
Diagnostic OR	109.2 (45.6-261.4)



CONCLUSIONS: Limitations in sensitivity of the 16S PCR for diagnosis may reflect varied methodologic quality, but also differing definitions of bacterial meningitis. Ongoing refinements in technology have the potential to make this a promising tool for rapid and accurate diagnosis.

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Differentiating between Methicillin Resisistant (MRSA) and Methicillin Sensitive (MSSA) Staphyllococcus Aureus Wound Infections in Children Based on Initial Presentation

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Pediatrics, Nassau University Medical Center, East Meadow, NY.

BACKGROUND: MRSA infection has become commonplace in both outpatient and inpatient arenas. This has affected our antibiotic choices when treating abscesses and cellulitis. The increased use of clindamycin has led to an increase in clindamycin resistant MRSA. No guidelines exist to differentiate MRSA from MSSA upon initial presentation that would enable physicians to choose the most appropriate antibiotic to prevent the emergence of resistance.

OBJECTIVE: To put foward a guideline based on initial presenting features that will help to select the most appropriate antibiotic.

DESIGN/METHODS: A retrospective chart review of 99 children below the age of 21 years seen in 2007 - 2008 at the Nassau University Medical Center who had positive wound cultures for MRSA or MSSA was done. Data was collected for: Age, Sex, Fever, Duration of illness before presentation, White Blood Cell(WBC) Counts, Location and size of abscess. The data was analyzed using statistical software SAS version 9.1 PROC FREQ methods.

RESULTS: There was no statistical significance was demonstrated when differentiating MRSA from MSSA on the basis of age, sex, fever, WBC Count, or days of illness befor evaluation. Location of the abscesses more towards the central body parts (defined as trunk, buttocks, inguinal area and thigh) correlated positively with MRSA as the culture report with an odds ratio of 2.66 (CI 1.09-2.69 and p 0.029).

CONCLUSIONS: 1. Cultures from lesions located toward the central parts of the body tend to be positive for MRSA rather than MSSA. 2. Physicians should consider this in selecting antibiotics for treatment. 3. Before this data can be used as a guidline for physician a larger study should be done.

171 Fellow in Training

The Graseby Capsule: A New Look at Old Technology

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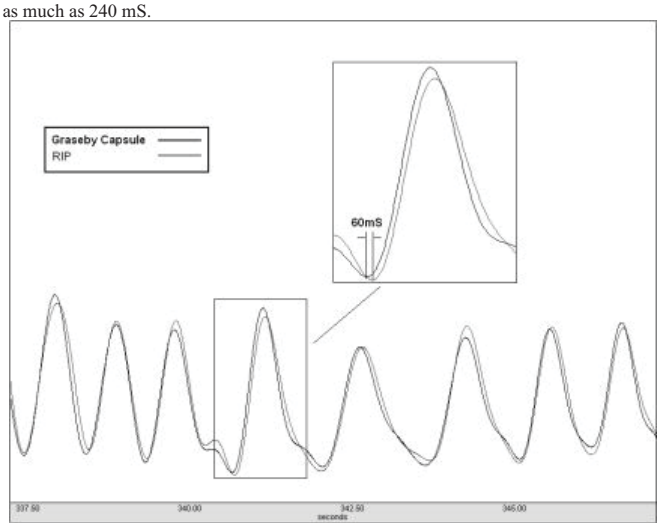
BACKGROUND: For many years, the Graseby capsule has been employed to identify the start of inspiration in infants, purportedly to facilitate the synchrony of respiratory support. However, few studies have adequately assessed the capsule's ability to even accurately sense respiration.

OBJECTIVE: To evaluate the performance of the Graseby capsule to track respiratory effort in a group of spontaneously breathing preterm infants, by comparing it to an accepted standard, Respiratory Inductance Plethysmography (RIP).

DESIGN/METHODS: Six infants were studied. Mean birth weight was 1242gm (range 900-1530), study weight was 1276gm (1060-1495), gestational age was 31 weeks (28-32) and age at study was 10 days (3-24). Two infants were on nasal cannula. Chest and abdominal RIP was used to document the breathing pattern. The Graseby capsule was placed subxyphoid. The capsule was connected to a calibrated pressure transducer and all data were simultaneously collected for 10 minutes during a period of quiet breathing via computer using the Biopac data acquisition system. Detection of respiratory cycle for both RIP and capsule data was by zero crossing of the first derivative by FIR filter with a low pass of 2Hz.

RESULTS: Mean respiratory rates, as determined by RIP, ranged from 49-64 bpm. The Graseby capsule not only accurately tracked respiratory efforts when compared to RIP (Figure), but the capsule waveforms were found to precede RIP waveforms (Figure insert). The difference between the onset of inspiration as determined by Graseby capsule vs RIP was calculated and the lead time was as much as 240 mS.



CONCLUSIONS: We conclude that with proper signal conditioning, the Graseby capsule provides a reliable respiratory phase indicator in spontaneously breathing preterm infants. In addition, when compared to the RIP signal we found that the Graseby capsule provides an earlier indication of the start of inspiration. Further investigation must now evaluate the use of the capsule to provide breathing synchrony with a respiratory support device in neonates.

172 House Officer

The Role of Pulmonary Follow-Up in Reducing Respiratory Rehospitalizations of Premature Infants

Liza Konnikova, Amanda McGeachey, Jaclyn Davis, Lawrence Rhein.
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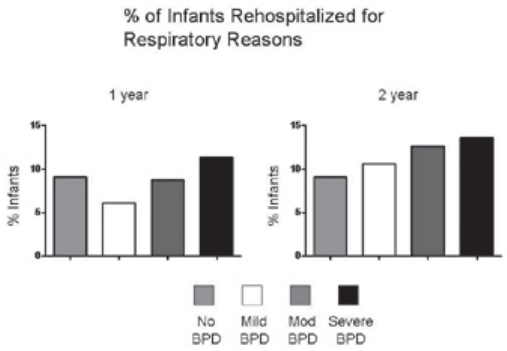
BACKGROUND: Despite improvements in neonatal care, premature infants remain a high-risk population after discharge from the NICU. Reported rates of rehospitalization for respiratory causes in the first year of life range from 35 to 50%. The role of pulmonary follow-up in preventing rehospitalizations is unknown.

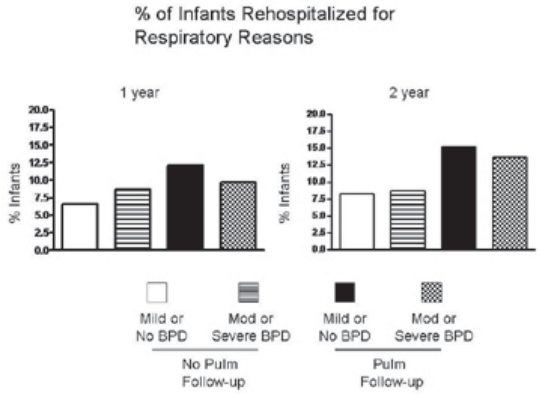
OBJECTIVE: The objective of this study is to describe respiratory outcomes in a large regional cohort of premature infants, and to determine whether pulmonary follow-up improves outcomes.

DESIGN/METHODS: The population included a cohort of 370 ELBW infants followed in the Center for Healthy Infant Lung Development or the Infant Follow-up Program at Children's Hospital Boston until the age of 2 years corrected gestational age (CGA). Emergency room visits or hospitalizations were identified through database query, and verified through electronic medical records.

RESULTS: Rates of respiratory rehospitalization at both 1 year CGA and 2 years CGA were relatively low, compared to the literature. Severity of BPD did not correlate with rates of respiratory rehospitalization.



We then compared rates of respiratory rehospitalization in infants with No BPD or Mild BPD with those with Moderate BPD or Severe BPD, according to whether they had pulmonary follow-up. Surprisingly, follow-up in pulmonary clinic did not seem to have a significant effect on this specific outcome.



CONCLUSIONS: Rates of respiratory rehospitalization were substantially lower than expected, even in patients with more severe BPD. Pulmonary follow-up alone does not seem to account for the improved outcomes.

173 House Officer

Late Preterm Infants: Defining Criteria for Admission to Newborn Nursery

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BACKGROUND: Late preterm infants (LPTI) are known to have more complications compared to term infants, however, there is little data on the influence of birth weight (BW) on postnatal morbidities. There are institutional variations regarding LPTI admission criteria to either NICU or regular newborn nursery (NBN). Some experts have suggested a cutoff of 2300 grams for admission to NBN.

OBJECTIVE: Determine the influence of BW on the incidence of early postnatal complications, length of stay (LOS) and NICU admissions in LPTI.

DESIGN/METHODS: This was a retrospective chart review conducted as part of larger QI effort. The study included all appropriate for gestational age (AGA) babies of 34 to 36 weeks gestational age (GA) born in an inner city tertiary hospital from 10/08 through 3/09. Infants with surgical diagnoses were excluded. Prenatal, intrapartum and postnatal data were collected. Babies were stratified into 2 BW categories: < 2300 grams (Group A) and ≥ 2300 grams (Group B). Outcomes included postnatal complications, LOS and rate of NICU admissions. Hospital length of stay >3 days was used as cutoff.

RESULTS: Of 128 babies, 23% were 34 wks, 26% were 35 wks and 51% were 36 wks. NICU admission was 100% for 34 wks, 68% for 35 wks and 17% for 36 wks. Mean GA of Group A babies was 34.7 ± 0.8 wks and Group B 35.6 ± 0.6 wks (p=0.01). 34 (81%) of Group A vs. 29 (34%) of Group B were admitted to NICU (p=0.03). Of those admitted to the NICU, 94% in Group A stayed in the NICU >24 hrs compared to 69% in Group B (p=0.01). Mean length of hospital stay was 7 ± 4 days in Group A and 3 ± 2 days in Group B (p=0.0). Group A babies were more likely to have postnatal complications compared to Group B with the exception of hypoglycemia.

Postnatal complications and LOS

	Resp. Difficulty	Septic Evaluation	Hypoglycemia	Feeding difficulty	Jaundice+Photo	Apnea	LOS > 3 days
Group A (N=42)	26%	52%	0%	5%	10%	7%	64%
Group B (N=86)	17%	28%	17%	2%	2%	2%	20%
p	.09	.00	.00	.29	.07	.15	.00

CONCLUSIONS: This data provides support for admission of all asymptomatic 36 wk infants and asymptomatic 35 wk infants >2300 gm to the NBN. Further studies should confirm adding birth weight cutoff guidelines to the admission criteria for late preterm infants to the Newborn Nursery versus the NICU.

174 Fellow in Training

Expression of Caveolin-1 in Infants with Pulmonary Hypertension and Congenital Heart Defect

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BACKGROUND: Caveolin-1, a major scaffolding protein is found in caveolae of a variety of cells including endothelial and smooth muscle cells (SMC). It interacts with a number of transducing molecules and inhibits cell proliferation. Loss of endothelial caveolin-1 has been reported in experimental and clinical forms of pulmonary hypertension (PH). We have previously shown that monocrotaline induced PH is associated with progressive loss of endothelial caveolin-1 and reciprocal activation of proliferative and anti-apoptotic pathways. Recent studies have shown enhanced caveolin-1 expression in pulmonary arterial SMC obtained from patients with PH. Enhanced expression of caveolin-1 in SMC has been implicated in altered Ca^{2+} handling, increased DNA synthesis and cell proliferation.

OBJECTIVE: We sought to examine the expression of caveolin-1 in the pulmonary vasculature of infants diagnosed to have PH associated with congenital heart defect (CHD).

DESIGN/METHODS: Included in this study were 4 patients with CHD, 3 with left to right shunt and 1 without an intracardiac shunt. Histological examination of lung sections in all showed increased pulmonary arterial medial wall thickness, indicative of PH. Using double immunofluorescence technique; we examined the expression of caveolin-1, PECAM-1 and smooth muscle alpha-actin in lung tissue (biopsy or autopsy) sections obtained from these patients.

RESULTS: Pulmonary arteries in patients with left to right shunt demonstrated variable loss of endothelial caveolin-1, indicative of endothelial cell damage. PECAM-1 was found to colocalize with endothelial caveolin1, and the loss of PECAM-1 occurred in parallel with that of endothelial caveolin-1.Arteries with extensive endothelial damage revealed enhanced expression of caveolin-1 in SMC. Both endothelial caveolin-1 and PECAM-1 were well preserved in pulmonary arteries of the patient with CHD without left to right shunt Importantly, SMC in this patient's lung did not exhibit enhanced expression of caveolin-1.

CONCLUSIONS: Loss of endothelial caveolin-1 and PECAM-1 is indicative of endothelial damage. Since caveolin-1 maintains proliferative and antiapoptotic factors in an inactive state, its loss may contribute to the activation of cell proliferative pathways. In addition, extensive endothelial damage may be a trigger for the enhanced expression of caveolin-1 in SMC, which may further facilitate progression of pulmonary vascular disease.

175 Fellow in Training

It's Not What She Knows, It's How Well She Knows It! The Hidden Problem in Perinatal Health Care

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BACKGROUND: A major contributor to the rising rate of prematurity is late preterm births (34-36wks, >70%). Interventions that can reduce the number of these deliveries will have the greatest impact on the incidence of prematurity. It is not known to what extent mothers are aware of the risk of mode of delivery as a cause of late preterm birth.

OBJECTIVE: To survey mothers at a Neonatal Intensive Care Unit (NICU) and a Well Baby Nursery (WBN) to assess their awareness of the definition of term gestation and risks of both cesarean section delivery (c/s) and scheduling a delivery at <39 weeks.

DESIGN/METHODS: We surveyed mothers at a Level 4 NICU and a WBN using CDC PRAMS (Pregnancy Risk Assessment and Monitoring System) & March of Dimes tools available in English & Spanish. Mothers were excluded if no consent, <18 yrs, or refusal of their physician. χ^2 & Fisher's Exact tests used; the α level was set at $p<0.05$.

RESULTS: 75% of eligible mothers completed the survey (51/78 NICU and 38/41 WBN). Just 10% of mothers did not know the correct definition of term gestation whereas 22% of non-white race and 25% of women who had not seen a provider in the previous year were the least aware (p's<0.05). 29% didn't know c/s poses additional maternal risks compared to vaginal delivery. This lack of knowledge was related to prior c/s, living below the poverty line, having less education & being single (p's<0.05). Curiously, 32% were unaware that it was not a good idea to schedule the delivery for convenience at 35-36 wks. This lack of knowledge was apparent in 47% of non-whites, 67% of Hispanics, 100% teenage mothers, 52% of unintended pregnancies & 72% of those that did not have a high school diploma. Knowledge was not related to previous preterm delivery. There was no difference in correct answers between WBN & NICU; demographics of both sites were similar except more blacks and single mothers not living with a partner were at NICU.

CONCLUSIONS: There is a striking lack of understanding in women of childbearing age regarding the risks, benefits and alternatives to themselves or their newborns - independently of whether their child was cared for in a NICU or WBN. We speculate that American perinatal health care would improve if women were more aware of issues and could more effectively advocate for services.

176 Medical Student

Regulation of Age-Dependent Type II Cell EMT Behavior

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BACKGROUND: Epithelial- Mesenchymal Transition (EMT) is a biological process by which epithelial cells undergo multiple biochemical changes that enable them to assume a mesenchymal cell phenotype. EMT can be activated in association with tissue repair and remodeling after injury in multiple organs including the lung. In the adult lung EMT is associated with progression of fibrosis. In contrast, fetal tissue is capable of wound repair without scarring or fibrosis. We previously have shown that MLE12 cells, similar to primary adult type II cells, undergo EMT after transforming growth factor (TGF)β1 and to a lesser degree epidermal growth factor (EGF) treatment, resulting in the expression of mesenchymal cell phenotype. In contrast, fetal rat 21d type II cells did not undergo EMT in response to those treatments.

OBJECTIVE: We hypothesize that ErbB receptors play a significant role in the age-related regulation of EMT.

DESIGN/METHODS: Isolated fetal d21 rat type II cells (>95% pure) were pretreated with cis-OH-proline to eliminate remaining fibroblasts, followed by a 5-day treatment of 2.5 ng/ml TGF-β1, 10ng/ml EGF, or the combination of both. Cells were harvested after 7d in culture for Western Blot analysis. MLE-12 cells were used as an adult lung epithelial cell model and treated similarly.

RESULTS: TGFβ1 treatment induced phosphorylation and protein content of ErbB2 receptor in MLE12 cells. In fetal rat type II cells, TGFβ1 induced a decrease in ErbB2 phosphorylation. This effect was less modest in EGF-treated cells. The results of EGF treatment are in agreement with the less proment EMT induction seen after EGF stimulation in both cell types.

CONCLUSIONS: These data suggest that regulation of ErbB receptor expression has a mechanistic role in the age-related induction of EMT. Further analyses are required to fully understand the function of ErbB receptor regulation in TGFβ1-induced EMT in type II cells. Funding: NIH HL085648, Tufts Institutional Grant, Deutsche Forschungsgemeinschaft Da 375?3-2.

177 Fellow in Training

Pulmonary Hypertension Secondary to CLD: A Cautionary Tale

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BACKGROUND: Preterm neonates with CLD are at risk of developing pulmonary hypertension (PH) secondary to altered angiogenesis, post natal lung growth and abnormal vasoreactivity. The management of PH is still being refined, however a goal to maintain normal CO_2 and alkalotic pH to decrease PVR, may necessitate invasive ventilation and all attendant interventions such as tracheostomy, gastrostomy and heavy sedation.

OBJECTIVE: To review the outcome of elective ventilation in PH associated with CLD.

DESIGN/METHODS: We present 4 extreme preterm's with PH and CLD (GA 26wks in 3 & 24 in 1) with severe RDS and prolonged ventilation (46, 104, 46 & 85 days), but successfully weaned to either NC or CPAP. All had severe PH treated with combination of iNO, Sildenafil, Bosentan and Prostacyclin targeting the 3 pathways of PVR (cGMP, Endothelin & cAMP). All underwent elective invasive ventilation to keep $PaCO_2$ in normal range (re-intubated on 165, 181, 189 & 161days). Subsequently all needed escalation of ventilatory support; with ventilator dependency necessitating tracheostomy without significant improvement in $PaCO_2$ and oxygenation, and worsening PH.

Ventilator parameters, FiO_2, pH and PCO_2 pre and post intubation

Day of Life - pre or post intubation		Ventilator setting			FiO_2	pH	PCO_2
Case 1	167- Pre	NC 2LPM			60%	7.32	87
	168 -Post D1	HFOV	delta P 20	MAP 18	50%	7.45	74
	170- Post D3	HFOV	delta P 35	MAP 15	90%	7.53	51
Case 2	180-Pre	SiPAP			40%	7.33	70
	181- Post D1	A/C Rate 40/min	PIP: 17	PEEP: 5	60%	7.28	81
	183- Post D3	A/C Rate 40/min	PIP: 23	PEEP: 5	100%	7.38	68
Case 3	188- Pre	NCPAP		PEEP 8	100%	7.32	97
	189- Post D1	A/C Rate 40/min	PIP: 25	PEEP: 5	100%	7.37	81
	191 Post D3	A/C Rate 60/min	PIP: 28	PEEP: 5	100%	7.32	81
Case 4	160 Pre	NC 3LPM			90%	7.32	84
	161 Post D1	A/C Rate 60/min	PIP: 25	PEEP: 5	100%	7.29	94
	163 Post D3	HFOV	Delta P:32	MAP:18	88%	7.4	65

Average NICU stay was 285 ± 52 (mean ± SD). Currently (chronological age 1, 2, 1.5 & 5.5 years) 2 are in chronic care facility and 3 are ventilator dependent with tracheostomies.

RESULTS: **Discussion:** Management of CLD allows for permissive hypercapnea and hypoxia, but when associated with PH, approach is still debated. CLD patients have chronic compensated respiratory acidosis keeping pH close to normal. Animal studies have shown that PVR is affected by pH alone rather than changes in PaCO2. Combination of therapies targeting the PVR pathways have shown to be beneficial.

CONCLUSIONS: Elective mechanical ventilation in PH associated with CLD should be avoided as it may trigger pulmonary hypertensive crisis with all attendant aforementioned morbidities. pH should be the guiding parameter in conjunction with modulators of vascular reactivity and optimizing somatic growth.

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Type and Timing of Ventilation in the First Postnatal Week Determines the Outcome of Bronchopulmonary Dysplasia (BPD)/Death

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BACKGROUND: Although it is recognized that premature infants on endotracheal tube ventilation (ETT) after 7 days of postnatal life have increased risk of BPD/death, the type and timing of respiratory support in the first week affecting this outcome has not been evaluated.

OBJECTIVE: To compare outcomes of premature infants on nasal intermittent positive pressure ventilation (NIPPV) or nasal continuous positive airway pressure (NCPAP) to those on ETT, in the first postnatal week.

DESIGN/METHODS: Retrospective data were obtained (1/04 to 6/09) of infants ≤30 weeks gestational age (GA) who received NIPPV anytime in the first postnatal week. BPD was defined using the NIH consensus definition. Infants were categorized into 3 groups based on their being on a particular mode for the majority of days in the first week. Generalized estimating equations (GEE) approach was used to model the probability of developing BPD/death by the type of breathing support, adjusting for the correlation between twins in the study.

RESULTS: There was no significant difference in the mean GA and birth weight (BW) in the 3 groups: ETT (n=64; 26.8w; 917g), NIPPV (n=65; 27.1w; 951g) and NCPAP (n=32; 27.4w; 971g). There were no significant differences in maternal demographics, use of antenatal steroids, gender, multiple births or SGA in the 3 groups. Use of surfactant was significantly different (91 vs. 83 vs. 50%; p≤0.001). In multivariate analysis, after controlling for other significant predictors, compared to ETT, NIPPV (p<0.02) and NCPAP (p<0.01) groups were less likely to have BPD/death. NIPPV and NCPAP groups were not different. Infants on ETT (n=97) during 1-3 days were significantly more likely to have BPD/death compared to those on NIPPV (n=38): 67 vs. 47%; p=0.035. Infants who remained on ETT (n=30) during 4-7 days were significantly more likely to have BPD/death compared to those extubated to NIPPV (n=36): 87 vs. 53%; p=0.003. There was no difference between infants extubated to NIPPV (n=52) during 4-7 days in terms of BPD/death versus those on NIPPV (n=23) during 1-3 days, and remained on NIPPV during 4-7 days. No differences were noted for infants extubated to NIPPV or NCPAP during 4-7 days vs. those on NIPPV during 1-3 days and then further changed to NCPAP during 4-7 days.

CONCLUSIONS: These data suggest that extubation to NIPPV or NCPAP in the first postnatal week decreases BPD/death.

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Androgen Inhibits TACE-Mediated Components of Fetal Type II Cell Surfactant Synthesis

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BACKGROUND: TACE is a member of the ADAM family of sheddase proteins. It is expressed in fetal lung fibroblasts and type II epithelial cells (T2) of gestational ages E16 - E18. TACE activation in T2 cells stimulates surfactant synthesis. Exposure to dihydrotestosterone (DHT) throughout lung development delays fetal lung maturation, increasing the risk of respiratory morbidity in the newborn. However the effects of androgen on TACE activity in lung development are still unknown.

OBJECTIVE: We hypothesized that fetal exposure to androgen during lung development inhibits TACE activity, leading to T2 cell maturational delay.

DESIGN/METHODS: Timed pregnant mice were implanted with DHT pellets (2mg/day) on E11 (term = 19 days). Primary fetal lung T2 cell cultures were prepared from E17 control and DHT-implanted mice and grown with/without DHT (10^{-8}[/sup]M). At 80% confluence cells were serum starved 3 hours, followed by no treatment (control), EGF (10ng/ml), NRG (3.3nM), TGFα (10ng/ml), PMA (TACE activator, 100ng/ml), IC3 (TACE inhibitor, 50nM), or PMA+IC3 for 24hrs. Surfactant production was measured as ^{3}[/sup]H-choline incorporation into disaturated phosphatidylcholine (DSPC) and by qRT-PCR measurements of SP-B, SP-C, fatty acid synthase (FASN) and ABCA3 mRNAs. Western blots were used to determine levels of TACE, FASN, and ABCA3 proteins.

RESULTS: In control cells DSPC synthesis was stimulated (p<0.001) by EGF (240% of control), NRG (260%), TGFα (230%), and PMA (198%) but was reduced to less than control in the presence of TACE inhibitor (IC3 and PMA+IC3). SP-B mRNA expression increased significantly (p<0.05) with exposure to EGF (350%), NRG (200%), TGFα(260%), and PMA (190%) while SP-C increased significantly (p<0.05) with EGF (280%), TGFα (230%) and PMA (245%). In DHT-exposed cells neither DSPC synthesis nor SP-B, SP-C, FASN or ABCA3 were affected by any treatments. Comparing control and DHT-exposed cells, DHT significantly prevented the effects of EGF, NRG, TGFα and PMA on DSPC synthesis and SP-B, SP-C, FASN and ABCA3 mRNA.

CONCLUSIONS: We conclude that treament with PMA (TACE activator) stimulated maturation of fetal T2 cells. However, DHT exposure inhibited the effects of EGF, NRG, TGFα and of PMA activation of TACE T2 cell maturation. Androgen blocks TACE activity important for T2 cell maturation. Support: HL37930, HD044784, Gerber Foundation, Peabody Foundation

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Nasal Intermittent Positive Pressure Ventilation (NIPPV) Does Not Facilitate Earlier Extubation in Infants Less Than 28 Weeks Gestation: A Pilot Study

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BACKGROUND: Bronchopulmonary dysplasia is multi-factorial with contributions from intubation and mechanical ventilation. Small clinical trials support NIPPV as an effective non-invasive mode of ventilation to avoid extubation failure in premature infants. It is unknown if NIPPV promotes earlier extubation from higher ventilator support and decreases days intubated.

OBJECTIVE: To test the feasibility that NIPPV facilitates extubation of ELBW infants from higher ventilator settings than customary clinical practice for infants with RDS.

DESIGN/METHODS: Infants between 24^{0} and 27^{6} weeks were eligible if they received surfactant prior to 48 hours of life for respiratory distress syndrome. Infants were randomized to either NIPPV or CPAP. Infants were extubated to NIPPV when conventional ventilator rates were 28 breaths per minute (bpm). Nasal ventilation was initiated with rates, peak pressures and PEEP of 33 bpm, 20 and 6 cm H_20. Infants were extubated to CPAP when conventional ventilator rates were ≤ 20 breaths per minute (bpm). All infants were given caffeine prior to extubation. Reintubation criteria were identical for each group. Outcomes were percent reintubated, days intubated, and adverse effects of NIPPV. Projected sample size was 20 infants in each group.

RESULTS: CPAP infants (n=18) and NIPPV infants (n=16) had comparable birth weight (812 ± 128 vs. 834 ± 177 grams) and gestational age (25.7 ± 1 vs. 25.7 ± 1 weeks). Maternal demographic and delivery characteristics were similar in both groups. NIPPV infants were extubated when the conventional ventilator rate was 26±2 bpm compared to 20±1 bpm for CPAP infants (p<0.001). Reintubation within first 7 days days following extubation occurred more frequently in NIPPV than CPAP (67 vs 28%, P < 0.05). The days intubated within the first 30 days was similar for NIPPV and CPAP (12±12 vs 14±11 days). There were no differences between groups in short and long term morbidities.

CONCLUSIONS: Higher rates of reintubation following extubation to NIPPV suggest that NIPPV may not be a feasible intervention to reduce the time on positive pressure ventilation.

181 Fellow in Training

Does Bubble CPAP Enhance Carbon Dioxide Elimination Compared to Ventilator-Generated CPAP?

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BACKGROUND: Bubble continuous positive airway pressure (B-CPAP) is widely used for neonatal respiratory support. Uncontrolled and retrospective cohort studies suggest that it may reduce chronic lung disease more effectively than ventilator-generated CPAP (V-CPAP). Whether the pressure oscillations generated by bubbling facilitate CO_2 removal remains controversial.

OBJECTIVE: To evaluate, in a bench study, the efficacy of CO_2 removal using B-CPAP in comparison to V-CPAP.

DESIGN/METHODS: We previously showed that the time needed to eliminate CO_2 from a test lung, as indicated by end-tidal CO_2 measurement ($ETCO_2$) is a good and reproducible indicator of the efficiency of ventilation. A 35 mL test lung attached to a pre-measured endotracheal tube was filled with 100% CO_2 and subjected to B-CPAP (flow 5L/min) or V-CPAP both at 5cmH_2O for periods of 10 or 20 min. The test lung was then connected to a Draeger Babylog ventilator with a standard circuit, humidifier, flow sensor and an in-line $ETCO_2$ monitor. The test lung was ventilated in A/C volume guarantee mode to ensure stable minute ventilation. PIP limit was 30 cmH_2O, PEEP 5 cmH_2O, IT 0.4s, rate 60/min and tidal volume 3.5mL. The hypothesis was that, if B-CPAP caused CO_2 to diffuse from the test lung more effectively than V-CPAP, there would be less CO_2 remaining after 10 or 20 minutes. The lower starting concentration of CO_2 would then make the CO_2 elimination time shorter at any given minute ventilation. $ETCO_2$ was continuously measured with a capnograph and exported to a spreadsheet. The time for $ETCO_2$ to fall to <8 mmHg (threshold of reliable detection by this instrument) was calculated for each experiment. Each experiment was repeated 3 times and the values were analyzed using paired t-test. p-values of <0.05 were considered significant.

RESULTS: The recorded times for each experiment were highly reproducible. CO_2 elimination was significantly faster after 20 min of B-CPAP vs. V-CPAP.

Study Duration	BCPAP	VCPAP	
	CO_2 elimination time	*CO_2 elimination time*	*p value*
10 minutes	184 ± 21 seconds	194 ± 18 seconds	0.57
20 minutes	138 ± 25seconds	178 ± 47 seconds	0.007**

CONCLUSIONS: Bubble CPAP results in significantly faster CO_2 removal compared to ventilator generated CPAP, which may translate into important clinical benefits. However, caution should be exercised in translating bench studies directly to clinical care. Further clinical studies into the benefits of Bubble CPAP are warranted.

182 Fellow in Training

Is Exhaled Nitric Oxide (FE_{NO}) Useful in BPD?

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BACKGROUND: Endogenous nitric oxide (eNO) is an important mediator of pulmonary vascularization and reactivity. High fractional concentrations of orally exhaled NO (FE_{NO}) in asthmatics have been reported, with drops after treatment with corticosteroids. Other diseases associated with high FE_{NO} include COPD, bronchiectasis, viral respiratory infections and post-transplant bronchiolitis obliterans. Measurement of FE_{NO} from ventilated preterm infants has always been problematic because of the need to do this offline, and particularly because of their small tidal volumes.

OBJECTIVE: We tested the hypothesis that FE_{NO} is associated with BPD in ELBW infants.

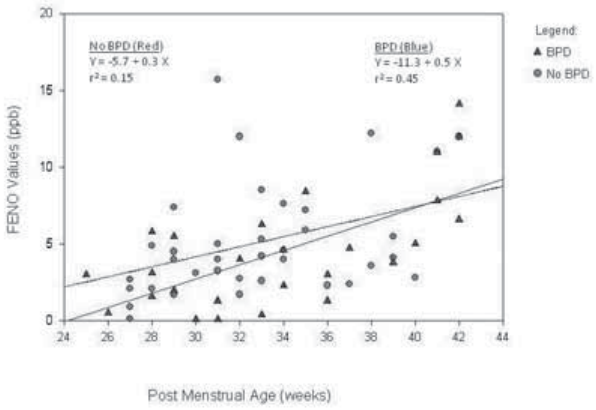
DESIGN/METHODS: ELBW infants (N=26) were enrolled in this study following informed consent. Replicate FE_{NO} measurements were made offline as described in the 2005 ATS/ERS recommendations after collection into NO-inert mylar bags.

RESULTS: Patients in the BPD group were smaller at birth than the patients in the No BPD group (P=0.004).

Demographic Data

	No BPD (N = 7)	BPD (N = 19)	P-value
BW (mean ± SD)	887 ± 56	673 ± 154	0.004
GA (mean ± SD)	27 ± 1.4	26 ± 1.8	0.3
Male Gender	2 (29%)	8 (42%)	0.7
Antenatal steroids	7 (100%)	15 (79%)	0.6
Surfactant	6 (86%)	19 (100%)	0.3
Maternal Pre- eclampsia	1 (14%)	6 (32%)	0.6
PPROM	3 (43%)	3 (16%)	0.3
Preterm Labor	5 (71%)	8 (42%)	0.4
Chorioamnionitis	1 (14%)	3 (16%)	1
Cesarean Section	2 (29%)	17 (89%)	0.006
Race			0.8
Caucasian	3 (43%)	7 (37%)	
Black	3 (43%)	7 (37%)	
Hispanic	1 (14%)	5 (26%)	

Detectable levels of FE_{NO} were plotted.



The lines intersect at approximately 41 weeks PMA.

CONCLUSIONS: Collections of exhaled gases from ventilated ELBW preterm infants revealed detectable levels of FE_{NO}. We speculate that there may be a maturational production of FE_{NO} and that patients who don't develop BPD may produce higher levels at a younger PMA, thereby conferring protection from BPD. Further, FE_{NO} measurements may improve the assessment of ELBW preterm infants, particularly to pulmonary inflammatory conditions and BPD.

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Does Early Onset of Necrotizing Enterocolitis Increase the Risk of Recurrent NEC?

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BACKGROUND: Data on recurrent NEC are limited to a chart review from 1993 and a few case reports. Characteristics these infants may have in common have not been described.

OBJECTIVE: Determine if there are identifiable clinical characteristics in neonates who develop recurrent NEC.

DESIGN/METHODS: A retrospective chart review was done of NICU patients at our center from 1/2003-10/2009 who developed recurrent NEC. Episodes of recurrent NEC were defined as the finding of pneumatosis or perforation distinct from the previous episode of NEC and separated by a period of advancing feeds. Data collected retrospectively from single episode NEC patients from 1/2006-10/2009 were used for comparison. This chart review did not include 2003-2005 infants as their charts were not initially as accessible. Potential risk factors such as need for DR resuscitation, use of antibiotics, need for PDA treatment and PDA treatment drug used, use of feeding additives and type of feeding were reviewed.

RESULTS: Infants with recurrent NEC developed NEC 5 days earlier than those with a single episode NEC (p=0.02). GA, BW, sex and 5 minute Apgar score, for the infants with and without recurrent NEC are similar (Table). At the end of 2006, our center switched from exclusively using indomethacin to exclusively using ibuprofen. We have had an increased number of infants with recurrent NEC during the indomethacin era vs the ibuprofen era, 3 infants vs 6 infants.

	Recurrent NEC (n=9)	Single Episode NEC (n=51)	p values
Gestational A (weeks)	28.6±3	28.9±3.4	0.78
Birth Weight (grams)	1127±530	1258±504	0.47
Males (%)	55	64	0.9
5 minute Apgar	6±1.2	7±1.3	0.1
Age at first NEC (days)	14.7±6.2	19.8±13	0.02
Age at discharge (days)	112.7±29.1	68.8±34.8	0.06

CONCLUSIONS: Neonates with recurrent NEC developed NEC earlier than those with a single episode of NEC. Responsible etiologic factors, including the introduction of ibuprofen for treatment of patent ductus arteriosus remain to be further explored. As the total number of infants with recurrent NEC is small, we will seek to review charts of infants with single episode NEC vs recurrent NEC at other level 4 NICUs to validate our findings and identify risk factors.

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Fellow in Training

Patterns of Flow at Children's Hospital

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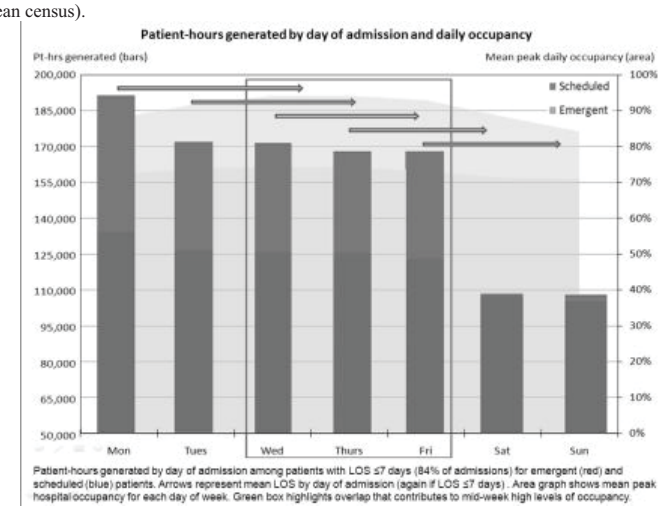
BACKGROUND: Optimization of patient flow is crucial to improving quality and value in healthcare, but variability comes from many sources, including artificial variability on scheduling patients to enter hospitals. In adult settings, artificial variability in scheduled ("elective") admissions is greater than variability in emergents, leading to variation in crowding.

OBJECTIVE: Determine how admission/discharge and occupancy patterns vary over time at a large children's hospital.

DESIGN/METHODS: Census data for FY08 were abstracted: date/time of admission/discharge, emergent/scheduled, length of stay (LOS). Hourly census was calculated with a SAS macro; peak daily census were extracted. For pts with LOS ≤7 days, pt-hours-generated by admit day = avg LOS (hrs) for each day x number of admissions. Coefficient of variation (CV; std dev/mean) assessed variability.

RESULTS: Among 22,310 admits (mean 1859/month, SD 150, CV 8.1%), 22% were scheduled. CVs on emergent & scheduled admits per month were equal (9.8% vs. 9.7%). May, July, August had >1 SD fewer emergent admits than mean, while June had >1 SD more scheduled admits. By day of week, emergent admits had CV 12.0%, while scheduled admits had CV 65.3%, driven by lack of weekend admits (and fewer on Thurs-Fri). For LOS ≤7 days (84% pts), each day generated mean 154,248 pt-hours of business (SD 33,816; CV 21.9%). Emergent pt-hours generated by admit day CV 9.6%, while scheduled CV 15.7%. Mondays generated 25.2% of all scheduled pt-hours; Tues, Wed 20% each. Median LOS for scheduled patients admitted on Mon was 2.1 days, while 1.2-1.3 on other weekdays (Fig 1). Wed and Thurs had highest peak census (1 SD above mean census).



Patient-hours generated by day of admission among patients with LOS ≤7 days (84% of admissions) for emergent (red) and scheduled (blue) patients. Arrows represent mean LOS by day of admission (again if LOS ≤7 days) . Area graph shows mean peak hospital occupancy for each day of week. Green box highlights overlap that contributes to mid-week high levels of occupancy.

CONCLUSIONS: Scheduled admissions are a major contributor to variability in occupancy and risk of mid-week crowding. Predictable patterns lead to high occupancy on some days and unused capacity on others. Hospitals interested in optimization, value, and avoiding crowding should assess their patterns. Further studies should link variability to outcomes (quality, access, finance, education, and staff satisfaction).

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House Officer

Telephone Triaging and Pediatric Residents: Where Are We?

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BACKGROUND: Telephone triage is an important aspect of primary care training. Little is known about the experience of pediatric residents and their patients with telephone triaging.

OBJECTIVE: To examine the experience with telephone triaging among pediatric residents and their continuity clinic patients

DESIGN/METHODS: We conducted a 2-week (9/09) record review of all parent telephone calls to a 24/7 residents' continuity clinic sick line at an urban academic medical center. Outcome measures were parental satisfaction and compliance with disposition. Using an edited version of HRSA's Patient Satisfaction Survey, we called a systematic sample of parents to assess satisfaction with the telephone encounter. Patient compliance with ED/clinic appointment was verified with the hospital database. We also conducted an online anonymous survey of pediatric residents to assess their level of comfort with telephone triaging, perceived educational value and recommendations for improvement.

RESULTS: A total of 214 calls were made to the sick line, 55% were answered by the residents. The highest concentration of calls (43%) was between 8-10 AM, 7% were afterhours, half were for children <1 year. Cough, congestion, fever and skin problems were the most common complaints. Most parents (89%) were satisfied with the advice and felt the provider had taken enough time. The majority of children (69%) were given the same or next day sick clinic appointment and 8% were referred to the ED. Compliance was 77% with the clinic appointment and 38% with the ED referral. Among the 25 residents who participated in the survey, 44% felt comfortable with telephone triaging at the beginning of residency. Now, 50% of PL-1 and 100% of PL-2 & 3s felt comfortable doing telephone triage. The majority (60%) felt it was important to learn telephone triage during residency training. Residents felt more frequent feedback and a formal curriculum would enrich the experience.

CONCLUSIONS: Parental experience with residents' telephone triage was very positive. Residents valued telephone triage as an important educational experience. Frequent feedback and a formal curriculum would enhance the learning experience and improve their level of comfort.

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Resident

Bottled or Tap Water: What Are Parents and Children Drinking?

Lina Huerta, Matilde Irigoyen.

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BACKGROUND: Fluoridation of tap water has proven a very effective public health measure for decreasing tooth decay in children. In the last decade, the sales of bottled water have shown a dramatic increase. Most bottled waters are not fluoridated and this may have an adverse impact on children's oral health.

OBJECTIVE: To assess current water preferences in children and adolescents, perceptions of the quality of tap and bottled water, and awareness of fluoride content in tap and bottled water in an urban pediatric patient population.

DESIGN/METHODS: We conducted an anonymous survey of a convenience sample of parents of infants and children and of adolescents seen at a pediatric and adolescent practice at an academic center in Philadelphia. The survey included questions on demographics and water preferences for drinking and cooking; perceptions of taste, clarity, safety and purity of tap and bottled water (on a 5-point Likert scale), and awareness of whether water had fluoride. Adolescents also rated the importance of water on health and beauty.
RESULTS: 208 subjects participated, age range: 1mo-22ys, 31% were <1 years, 15% 1-5 years, 12% 6-12 years, 42% 13+years; 86% were African American (AA), 10% Hispanic; 85% had Medicaid. Almost half (42%) drank both tap and bottled water, 40% only bottled, 18% only tap water (53% unfiltered, 30% filtered, 16% boiled). There were no significant differences between parent, children and adolescent water drinking preferences. By contrast, most parents (89%) used tap water for cooking. Regarding formula preparation for infants, 52% parents used only bottled water, 30% used only tap water (Unfiltered 47%, Boiled 42%), and 18% used both tap and bottled water. Ratings of taste, clarity, purity and safety were consistently higher for bottled water than tap water (taste: OK/very good 84% bottled vs. 62% tap- no difference for filtered or not). Parents and adolescents (76%) were not aware of whether bottled or tap water had fluoride. Adolescents believed water was important for health (95%), skin (89%), beauty (75%), and weight (75%). There was no significant difference in water preferences or ratings between AA and Hispanic subjects.
CONCLUSIONS: Bottle water drinking was highly prevalent in an urban pediatric and adolescent patient population. Perceptions of the attributes of tap water seem to affect water-drinking preferences and consumption patterns and may potentially adversely affect fluoride intake in children.

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Parental Attitudes and Experience with Infant Swaddling in an Inner City Population

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BACKGROUND: Sudden infant death syndrome (SIDS) is the leading cause of death in infants in the US. Its prevalence is highest among African Americans (AA). Swaddling, an ancient practice, enhances infant comfort and sleeping and decreases the likelihood of SIDS. The use and acceptance of swaddling in US populations has not been explored.
OBJECTIVE: To explore the attitudes and experiences with infant swaddling in an inner city population.
DESIGN/METHODS: We conducted a survey of a convenience sample of parents of infants 2 weeks- 3 months of age at an inner city pediatric practice. The survey was adapted from the IFPS II (Infant Feeding Practices II) and the Advocate Health Care Sleep Questionnaire, and included questions on infant feeding and sleeping. Additional questions were created to assess parental knowledge of, experience with, and attitudes regarding swaddling.
RESULTS: 43 parents participated: mean age was 24 years, SD 7.8 (14-53); infants mean age was 6.4 wks; 67% were AA, 21% Latino; 87% had Medicaid. 42% of infants were being breastfed. 61% of parents always put their babies to sleep on their back, 12% never did. Half the infants (51%) slept in bed with their parents at least some of the time. When shown a picture of a swaddled infant, 43% of parents recognized the term swaddling, others used a variety of terms, ie burrito, mummy or cocoon wrap. Most mothers (88%) remembered seeing the nursery nurses swaddle their baby, 60% also remembered being taught how to swaddle. Most mothers continued to swaddle their babies after discharge, 23% used it for calming the baby, 74% to put the baby to sleep (26% often, 48% sometimes). Half the parents (55%) felt their baby liked to be swaddled. Most parents (81%) had no concerns with swaddling. Those with concerns (19%) most commonly feared the blanket would cover the face or the baby would be wrapped too tightly and unable to move. The correlation coefficient for swaddling and belly sleeping was -0.28 (P= 0.07) and for swaddling and co-sleeping was -0.27 (P= 0.08). Although not statistically significant, it showed a trend towards safe sleeping practices associated with infant swaddling.
CONCLUSIONS: Swaddling is a common practice among inner city parents, although they were frequently not familiar with the term. This study suggests infant swaddling has a positive effect on safe infant sleeping practices. Future studies should explore the strategies to increase swaddling as a means to decrease SIDS.

188 House Officer

The Role of Qualitative Methods in Improving Breastfeeding Support in Pediatric Practices

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BACKGROUND: Breast milk is the optimal source of nutrition for infants, yet breastfeeding rates are below national goals. Despite a recommendation from the AAP that most infants be fed only breast milk until 6 months, few families achieve that goal. Previous studies document an association between low literacy and low breastfeeding rates, suggesting that the content and format of breastfeeding promotion materials could be improved.
OBJECTIVE: To gather qualitative data for improvement of educational materials for breastfeeding promotion.
DESIGN/METHODS: The study consists of focus groups and interviews with women recruited from a clinic in a low income neighborhood. Participants include adult women who breastfed an infant in the past 12 months, and stopped breastfeeding or began formula supplementation before three months. A moderator facilitated conversation around three topic areas: hospital experiences, problems encountered after discharge, and sources of information used to overcome challenges during breastfeeding. Focus groups and interviews were recorded and transcribed. Independent reviewers extracted themes from the transcriptions. Differences were reconciled by a third reviewer.
RESULTS: A key theme was interest in educational materials specific to situation and culture. Participants preferred materials explaining problems they had experienced (e.g., sore nipples). They expressed enthusiasm for scenes of cultural familiarity. Women described lack of support for breastfeeding in the hospital, at home, and in the community. Availability of formula in the hospital contributed to early supplementation. Additionally, lack of understanding among family members about the frequency of breastfeeding was identified as a barrier in the home. Participants also expressed a perceived disapproval with public breastfeeding as a barrier within the community.
CONCLUSIONS: Women who choose to breastfeed weigh perceived benefits against the difficulties they face, often with little support. Improving support in the outpatient setting requires messages that acknowledge these challenges and help families to find ways to address them. Materials for breastfeeding promotion should exhibit cultural variety and address specific challenges. Development of educational materials targeting family members should be considered. Qualitative methods can serve to elicit additional information for quality improvement in breastfeeding educational materials.

189 Fellow in Training

Easier Said Than Done: HIV Screening in Pediatric Primary Care

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BACKGROUND: HIV+ individuals who are unaware of their status present a major hurdle to stopping the spread of HIV. Over half of infected adolescents are unaware of their infection. Early detection leads to improved treatment and outcomes. The CDC 2006 guidelines for HIV screening recommend routine screening for all adolescents.
OBJECTIVE: To ascertain providers' perceptions and practice regarding HIV testing and to identify barriers that prevent compliance with the CDC guidelines.
DESIGN/METHODS: A cross-sectional descriptive study of primary care providers, including residents and clinical preceptors, was performed at a pediatric residency program's continuity clinic sites. A questionnaire was designed to identify the provider's knowledge, practices, and barriers associated with testing, and it was distributed as an anonymous e-mail survey.
RESULTS: Of 90 providers in the program, 50 completed the survey (56%), of whom 31 were residents and 19 were attending physicians. 76% of respondents screen only sexually active patients for sexually transmitted infections (STIs). Only 8% screen all of their adolescent patients, and only 28% are familiar with the CDC guidelines for adolescent screening. When testing for STIs, 50% always include HIV testing, 34% sometimes test for HIV, & 16% test only high risk adolescents. Reasons for not testing include: patient's refusal of testing/having blood drawn (71%), difficulties with the process (25%), & time constraints (4%). 48% of all surveyed feel that HIV testing is somewhat or very difficult. Confidentiality (40%), patient refusal of testing (19%) and logistics of HIV testing (15%) are identified as the parts of the testing process that are the most difficult. 70% state they would test more frequently if rapid testing were available.
CONCLUSIONS: Few of those surveyed report performing routine HIV screening for their adolescent patients. Only half of the providers always test for HIV when they check for other STIs. Our study suggests that in order to achieve screening of all adolescents in pediatric primary care, routine testing for HIV in adolescent patients should be incorporated into pediatric residency training. In addition, barriers to implementation, such as need for written consent and lack of resources for point of care rapid testing, must be addressed.

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Infant Formulas 2010: Claims and Clinical Evidence

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BACKGROUND: A highly competitive infant formula market in the U.S has resulted in direct-to-consumer marketing campaigns intended to promote the sales of modified formulas that claim to ameliorate common infant feeding problems.
OBJECTIVE: To identify and classify the commercially produced term infant formulas, catalog the clinical benefits they claim to produce, assess the evidence basis of these claims and assess the formulas' statements regarding breast-milk.
DESIGN/METHODS: Data on 20 formulas' composition and claims were gathered from formula can inspection on visits to 3 popular chain stores and from the websites of the three major formula manufacturers. We excluded pre-term, next step, generic, and specialized formulas. These statements were classified as being neutral or making direct or indirect clinical claims. The evidence basis for the claims was sought in Cochrane reviews and Clinical Evidence. Statements about breast-milk were classified as either neutral or favoring breast-milk.
RESULTS: Of the 20 commonly sold formulas 9 are lactose-free, or reduced, 8 contain either partially or fully hydrolyzed protein, 2 are thickened with rice starch. Of 57 statements from the cans, 19 make either direct or indirect claims. Examples of direct claims are " For fussiness and gas due to lactose sensitivity"(for a lactose-free formula) and "For fussiness, gas, and spit-up (for an unthickened soy formula). Direct claims for fully hydrolyzed formulas are "For food allergies and colic due to protein sensitivity" and " for babies with colic due to cow's milk protein allergies". Indirect claims include "easy to digest" for a lactose-free formula and "with comfort proteins for easy digestion" for 3 partial hydrolysates. There is insufficient or no evidence to support the claims that removing or reducing lactose, milk protein, or using hydrolyzed protein benefits infants with fussiness, gas, or typical colic. Claims regarding the use of thickened formula for spit up are recognized as " may be effective". Of 11 statements about breast milk 2 are favorable, e.g., our "closest formula to breast milk" and 9 were neutral.
CONCLUSIONS: The majority of the U.S. commercially marketed infant formula products are either lactose reduced or contain hydrolyzed protein. There is little to no evidence for the vast majority of the clinical claims they make. Favorable mentions of breast milk on formula cans are greatly outnumbered by other statements. Increased regulation of formula marketing claims in the U.S. is warranted.

191 House Officer

Assessment of Quality of Care in Adolescent Males in an Inner City Setting

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BACKGROUND: Previous studies have demonstrated lower rates of primary care visit and significant morbidity and mortality resulting from increased risk taking activities among adolescent subjects. This is especially pronounced among adolescent males compared with adolescent females. Furthermore low- income adolescents are less likely to be insured or have a primary care provider. Little is known about the quality of care received by adolescent males living in an urban environment.

OBJECTIVE: To assess the perception of the quality of health care and preventive counseling given to adolescent males in an inner city setting by primary care pediatricians in outpatient clinics.

DESIGN/METHODS: 14 to 18 year old boys seeking care in 3 ambulatory clinical settings in the Bronx who had a primary care visit in the last 12 months completed the Young Adult Health Care Survey (YAHCS), a validated instrument, which measures the perception of quality of health care advice. Although this survey has been used in suburban populations it has not been evaluated in an inner city setting. Descriptive analyses of the YAHCS were explored to assess the frequency of risk taking behaviors and the perceived health care activities and counseling provided by primary caregivers.

RESULTS: 37 subjects completed the survey. 43.2% of respondents were Black and 56.8% were of Hispanic origin. The mean age was 15 years. 84.4% of the adolescents had seen a doctor in the past year. Among risk behavior measures, 35% of adolescents stated they had sex, 78% consumed alcohol in the past month, 22% felt depressed, and 8% smoked in the past year. Overall 27.5% to 56.8% of optimal care was observed for preventive counseling and screening services. 56.2% of respondents reported that they experienced private and confidential care. Average scores on the measurement scales ranged from a low of 27.5% for counseling and screening on risky behaviors and emotional health to a high of 56.8% for screening and counseling on diet, weight, and exercise. Counseling and screening for sexual activity and STDs was 39.4%. No statistical difference was noted amongst the different quality measures and ethnicity.

CONCLUSIONS: Adolescent males living in an urban environment are vulnerable to adverse outcomes and have high rates of risky behaviors. Furthermore, significant deficits exist in the preventive care and counseling for this population.

192 Fellow in Training

Perception and Attitude of Caregivers toward Pain and Anxiety Associated with Pediatric Vaccine Injection

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BACKGROUND: Most children will receive a minimum of 20 vaccine injections (VI) by age 6 years. While the pain associated with VI is brief, the associated anxiety and fear can be significant and may lead to non-compliance with vaccination as well as prime the child for increased anxiety during future health care visits. Despite the many options available for control of the pain and anxiety (P&A) during VI, they are not often used.

OBJECTIVE: The objective of this study is to determine primary care providers' (PCPs') perception of the P&A experienced by 4 to 6 year-old children during VI, and to investigate barriers to the use of P&A control measures in the office setting.

DESIGN/METHODS: We surveyed PCPs (pediatricians, housestaff) from two clinics affiliated with a large urban medical center who provide primary care to pediatric patients. In addition to demographic data, PCPs were asked to rate their perception of P&A associated with VI in an average 4-6 year old using a validated visual analog scale, 0 (no pain/anxiety)-10 (very severe pain/anxiety). PCPs also rated their attitudes, and perceived barriers, toward providing control for P&A.

RESULTS: Of the 70 PCPs surveyed, 48 (69%) were trainees. The mean PCP perception of pain associated with VI was 5.7 (95%CI: 5.3-6.1) and perceived anxiety was 7.7 (95%CI: 7.2-8.1). There was no difference in PCP perception of pain when compared for provider sex, age, level of training, having children of their own, or number of vaccines ordered per week. Trainees recorded higher anxiety than attending physicians [8.0 vs. 6.9 (p=0.01)]. In terms of barriers to the use of P&A control measures, a minority of respondents felt that P&A control measures were too time consuming [23 (33%)], too expensive [11 (16%)] or require too much manpower [17 (24%)]. In fact, 63 (90%) felt that P&A control is achievable in their office setting. Nevertheless, only 8 (11%) of PCPs order any P&A control measures during VI.

CONCLUSIONS: In our study group, PCPs believed that the average 4-6 year old child is very anxious about VI and that the injection is moderately painful. Although the vast majority (90%) of respondents agreed that P&A control is achievable, only 11% attempted to provide P&A control measures during VI. Further study is needed to determine why there is a persistent gap between the PCPs' perception of P&A and practice of P&A control measures during VI.

193 Graduate Student

Twenty Years of Ethics Consults in a Pediatric Hospital

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BACKGROUND: As pediatric medicine has evolved over the years, the kinds of ethical conflicts encountered by children's hospitals potentially also change. An understanding of the ethical conflicts that occur in pediatrics can help inform efforts to improve the delivery of family-centered care.

OBJECTIVE: To describe ethics consults at an academic children's hospital.

DESIGN/METHODS: Our multidisciplinary hospital ethics committee has provided consultation services for the past 20 years, that can be requested by any staff member, patient, or family. After obtaining IRB exemption, we reviewed written consult summaries to extract: year of consult, child age, underlying diagnosis, and person requesting consult. Two investigators read through all summaries to code for themes about the reason for the consult, and the nature of the conflict.

RESULTS: Data was available for 80/82 consults performed between 1992-2009. Overall, 42 (54%) involved adolescents; 24(30%) infants and 12(16%) newborns. Consults regarding newborns increased over the years, and involved a wide variety of diagnoses included prematurity, chromosomal, and oncologic disorders. Consults were requested by medical staff (n=65, 81%), nurses (n=10, 12%), and families (n=5, 6%). We coded 49(62%) consults as interprofessional conflicts- differing opinions among a medical team; 27(34%) conflicts were between medical staff and the patient/family; and 3(4%) were among family members. Outcomes of the consultation included 17(21%) recommendations supporting a patient/parent position; 11(14%) recommendations supporting a hospital position, 9(11%) recommendations supporting decisions to withdraw or withhold care; 14(17.5%) recommendations supporting provision/continuation of care. In 11(14%) cases, the ethical issues were outlined but no specific recommendation was made; in 12(15%) cases, education to family or staff was recommended; and 6(7.5%) cases were deemed not ethical issues.

CONCLUSIONS: Nearly 40% of consultations involved family-staff or inter-family conflicts; however, only 6% were requested by families. Advertising the ethics consultation service may be an important mechanism to promote more family-centered care. Also, over half of consultations involved adolescents; issues of autonomy, capability and emerging independence are critical to consider in responding to ethical issues in this group.

Neonatology - Clinical Studies II Platform Session

Sunday, March 28, 2010
9:45 AM-12:00 PM

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9:45 AM

Effects of Supplemental Thyroid Hormone on Heart Rate and Blood Pressure in Extremely Low Gestational Age Neonates (ELGANs): THOP1 Trial

Edmund F. LaGamma, Shawn Gulati, Aleid G. vanWassenaer, Susana Ares, Joke H. Kok, Jose Quero, Gabriella Morreale de Escobar, Sergio G. Golombek, Ting Hong, Mohammad H. Rahbar, Delbert A. Fisher, Nigel Paneth.
Div of Newborn Medicine, Pediatrics, Maria Fareri Children's Hosp-NYMC, Valhalla, NY; Div of Newborn Medicine, Pediatrics, Emma Children's Hospital, Academic Medical Center, Amsterdam, Netherlands; Div of Newborn Medicine, Pediatrics, Hospital La Paz, Autonomous Univ of Madrid, Madrid, Spain; Epidemiology, Pediatrics & Human Development, Michigan State University, East Lansing, MI; Center for Clinical and Translational Sciences, University of Texas Health Science Center, Houston, TX; Nichols Institute, Quest Diagnostics, San Juan Capistrano, CA.

BACKGROUND: Transiently low levels of thyroid hormones occur in ~50% of neonates born 24-28 wks gestation & are associated with higher rates of CP & cognitive impairment (Sem Perinatol 32(6):2008). Raising thyroid hormone levels shows promise for improving neurodevelopmental outcome. Thyroid hormones are also necessary for cardiac function in fetal and postnatal life (ventricular performance, peripheral vascular resistance & myocyte metabolism). It is not clear whether neonatal Rx affects cardiovascular status.

OBJECTIVE: To determine whether 4 thyroid hormone (TH) supplementation regimens that were compared to placebo or iodine supplementation in a randomized trial (Peds 124:e258,2009) and shown to affect T_3, T_4 & FT_4, also altered highest daily HR or systolic BP.

DESIGN/METHODS: 181 neonates 24-28 wks gestation were enrolled < 24h of birth and randomized to one of 6 treatment arms: placebo (D5W), potassium iodide (30 µg/kg/d) or continuous or bolus daily infusions of either 4 or 8 µg/kg/d of T_4 for 42 d + 1 µg/kg/d T_3 x 14d in T_4 Rx groups; because of a dosing error, 13 infants received 16 µg/kg/d of T_4. FT_4, TT_4, TSH, T_3, TBG & cortisol were measured at 0, 3, 7, 14, 28, 42, & 56d.

RESULTS: HR rose (birth: 169±14; x±sd) in the first 3d in all study arms, then plateaued in placebo/KI but showed a further dose-dependent increase during d3-14 (+5 bpm, mean value) for each unit increase in TH dose ($r = 0.9$, $p<0.002$). Elevated HR in treated infants peaked at 7-10d but resolved by 14d. Among hormones, HR elevations correlated best with FT_4 and T_3 blood levels and not at all with cortisol levels. On day 7, 90% of HR values above the population mean (179 bpm) were in the hormone treated arms, compared to 49% of subjects below that threshold ($p<0.001$). From 3-to-14d, only the 16 µg/kg/d group showed an increase in systolic BP ($p<0.05$ vs other grps; max 67±7 mmHg; d6-10).

CONCLUSIONS: Elevation of TT_4, FT_4 and T_3 resulting from treatment with 4 & 8 µg/kg/d TH was associated with elevations in HR without effects on BP suggesting improved cardiac output and blood flow. TH effect is likely peripheral and not directly related to the CNS effects of TH. Future trials will be needed to assess the long-term developmental impact of such supplementation.

NINDS #45109

195 Fellow in Training

10:00 AM

Sirtuin1 in Tracheal Aspirate Leucocytes: Possible Role in the Development of Bronchopulmonary Dysplasia in Premature Infants

Kartik Mody, Judy G. Saslow, Suganya Kathiravan, Riva Eydelman, Vishwanath Bhat, Gary Stahl, Sulaiman Sannoh, Kee H. Pyon, Charles Hewitt, Vineet Bhandari, Zubair H. Aghai.

Pediatrics/Neonatology, Cooper University Hospital-UMDNJ-Robert Wood Johnson Medical School, Camden, NJ; Surgery, Cooper University Hospital-UMDNJ-Robert Wood Johnson Medical School, Camden, NJ; Pediatrics, Yale University School of Medicine, New Haven, CT.

BACKGROUND: Sirtuins (SIRTs) are class III histone deacetylators and play a role in regulating key inflammatory mediators. In animal models and adults with COPD and asthma, SIRTs are protective against lung inflammation. The role of SIRTs in the development of bronchopulmonary dysplasia (BPD) in premature infants is unknown.

OBJECTIVE: To study the association between the expression of Sirtuin1 (SIRT1) in tracheal aspirate (TA) leucocytes and the development of BPD in premature infants.

DESIGN/METHODS: Serial TA samples were collected on days 1, 3, 5 and 7 from 51 mechanically ventilated premature neonates [gestational age (GA) <30 weeks (w), birth weight (BW) <1250 grams (g)]. The immunoreactive SIRT1 was localized by immunocytochemistry using rabbit polyclonal antibodies directed against the SIRT1 on cytospin slides. SIRT1 staining was quantified on a score of 0-4 by a blinded observer. BPD was defined as the need of supplemental oxygen at 36 weeks postmenstrual age (PMA).

RESULTS: A total of 128 TA samples were collected from 51 infants (mean±SD, GA 25.5±1.4w, BW 762±174g). Eleven infants (GA 26.01.8w, BW 931287g) survived without BPD at 36 weeks PMA and 40 infants (GA 25.41.4w, BW 741148g) died before 36 weeks PMA or developed BPD. SIRT1 was localized in the cytoplasm and nuclei of mononuclear (MONO) as well as polymorphonuclear (PMN) cells. There was no significant difference in SIRT1 localization in the cytoplasm of MONO or PMN cells in two groups. SIRT1 was significantly more localized in the nuclei of mononuclear cells in infants with no BPD compared to infants who developed BPD or died before 36 weeks PMA.

	NO BPD (n=11)	BPD or DIED (n=40)
PMN, cytoplasm	1 (0-2)	1 (0-3)
MONO (cytoplasm)	3 (1-4)	2 (0-3)
PMN (nuclei)	1 (0-3)	0.5 (0-4)
MONO (nuclei)	3 (2-4)*	2 (0-4)

*P=0.007; SIRT 1 score: median (range)

CONCLUSIONS: SIRT1 is expressed in MONO as well as PMN cells from ventilated premature infants. The localization of SIRT1 was more pronounced in the nuclei of MONO cells in infants with no BPD compared to infants who developed BPD or died before 36 weeks PMA. We speculate that SIRT1 has an important role protecting premature infants in acute lung injury.

196 Fellow in Training

10:15 AM

Blood Lactate Levels in Potential ECMO Candidates with Persistent Pulmonary Hypertension of the Newborn (PPHN)

Ashaki M. Brown, Kabir M. Abubakar, Jennifer Berg, Margaret Rodan, Martin Keszler.

Neonatology, Georgetown University Hospital, Washington, DC.

BACKGROUND: Criteria for initiation of neonatal ECMO have been based primarily on gas exchange parameters. In some infants, circulatory failure may lead to the need for ECMO even when gas exchange is acceptable. Elevated blood lactate levels are associated with higher mortality in adults with shock, but the value of lactate as an index of impaired tissue oxygenation in newborns has not been established. Elevated lactate levels may identify neonates with PPHN with worsening tissue oxygenation and impending circulatory failure who may need ECMO.

OBJECTIVE: To determine if blood lactate levels are elevated in infants with PPHN who required ECMO.

DESIGN/METHODS: Blood lactate measurements, available as part of blood gas analysis in our unit, were obtained in 63 infants > 34 wks gestation treated for PPHN at Georgetown from 2006-2009. Data were abstracted from medical records on admission and every 2 hours until resolution of PPHN (FiO2<0.50) or initiation of ECMO. Lactate levels, oxygenation index (OI), pH, and mean BP were compared between infants who did and did not require ECMO. Data were analyzed using t-test, chi-square and logistic regression.

RESULTS:

	No ECMO (n = 45)	ECMO (n = 18)	p value
GA(wk)	38 ± 1.7	39 ± 1	0.269
BW(kg)	3.4 ± 0.7	3.45 ± 0.7	0.799
Mean BP	50 ± 7	50 ± 7	0.90
pH	7.38 ± 0.04	7.35 ± 0.07	0.06
Oxygenation Index (OI)	7 ± 3	23 ± 15	<0.001
Lactate	1.8 ± 1.1	3.9 ± 3.0	0.009
Lactate ≥ 2.5 mmol/l	22.2%	55.6%	0.01

Values are Mean ± SD

Infants with lactate ≥ 2.5mmol/l were 4.38 times more likely to require ECMO than infants with lower levels (OR 4.38, 95%CI 1.36-14.03, p = 0.013). Controlling for lactate, infants with increasing OI were twice as likely to need ECMO (OR 2.12, 95%CI 1.27-3.53, p = 0.004). Excluding 12 infants with perinatal asphyxia, who as a group had higher lactate levels, did not change the results (Lactate level No ECMO: 1.5±0.7; ECMO: 3.1±1.9, p = 0.005. Lactate ≥ 2.5: OR 9.625, 95%CI 2.03-45.69, p = 0.004).

CONCLUSIONS: Blood lactate levels were higher in infants with PPHN who required ECMO vs. those who did not. Elevation of blood lactate levels may signal worsening tissue oxygenation and may provide an important tool in earlier identification of infants with PPHN who will require ECMO. The utility of blood lactate in these patients needs to be prospectivley evaluated.

197 House Officer

10:30 AM

Survival without ECMO in Neonatal Hypoxemic Respiratory Failure (HRF) Is Associated with Lower Oxygenation Index (OI) and Higher Peak Methhemoglobin (MHb) Level

Shaon Sengupta, Chang Xing Ma, Rita M. Ryan, Satyan Lakshminrusimha.

Pediatrics, University at Buffalo, Buffalo, NY; Biostatistics, University at Buffalo, Buffalo, NY.

BACKGROUND: Inhaled nitric oxide (iNO) is approved for neonatal HRF but is effective in only 60% of patients. Failure to deliver iNO to the pulmonary vasculature can lead to poor interaction with hemoglobin in RBCs resulting in low methemoglobin(MHb) levels. We have recently reported that inadequate oxygenation response to iNO is associated with a lower MHb÷cumulative iNO exposure ratio (Pabalan et al, J Perinatol(2009)29,698-701). The chief determinant of NO bioavailability is local concentration of superoxide anions. Thus high OI prior to iNO therapy may reduce its efficacy.

OBJECTIVE: To evaluate the relationship between OI prior to and peak MHb levels following NO/placebo administration to survival without ECMO in neonatal HRF. Infants with HRF who needed ECMO and/or died were used for comparison.

DESIGN/METHODS: A database of baseline OI, peak MHb, NO dose and outcome in 503 neonates with HRF from three randomized trials of iNO (NINOs, Roberts et al, NEJM1997; Clark et al NEJM2000) was obtained from Ikaria.

RESULTS: Peak MHb levels were higher in the iNO group compared to placebo. Neonates in the iNO group who survived without ECMO had significantly higher peak MHb levels corrected for NO dose compared to ECMO/death group. Interestingly, neonates in the placebo group who survived without ECMO had higher peak MHb levels compared to infants who went on ECMO/died. OI was significantly lower among survivors without ECMO compared to ECMO/death.

Peak Methemoglobin (MHb) levels and outcome (Mean±SD)

Group	Nitric Oxide(n=257)		Placebo(n=246)	
	ECMO/death(n=112)	Survival without ECMO(n=145)	ECMO/death(n=157)	Survival without ECMO(n=89)
Birth weight(g)	3427±552	3368±579	3334±605	3337±632
Gestational age(wk)	38.1±8	38.4±5.9	38.6±5.8	37.1±8.9
Peak MHb(%)	1.854±1.813†	2.2±2.17†	0.96±0.535	1.19±0.96*
Peak MHb corrected for NO dose	0.075±0.087	0.137±0.173*	n/a	n/a
OI prior to study gas	41.3±29.9	24.7±15.9*	45.2±31	29.7±14.7*

* p < 0.05 cf. corresponding ECMO/death, † p < 0.05 cf. corresponding placebo

CONCLUSIONS: In neonates with HRF resulting in ECMO/death, peak MHb levels are lower than in infants surviving without ECMO suggesting inadequate delivery of iNO to pulmonary vasculature. Lung recruitment in patients with parenchymal lung disease and initiation of iNO at lower OI may improve the chances of survival without ECMO in neonatal HRF.

198 Fellow in Training

10:45 AM

Risk Factors for Necrotizing Enterocolitis Totalis

Alecia M. Thompson, R. Lawrence Moss, Matthew J. Bizzarro, Karen Diefenbach, Joyce Simpson, Richard A. Ehrenkranz.

Pediatrics, Yale New Haven Hospital, New Haven, CT; Pediatric Sugery, Yale New Haven Hospital, New Haven, CT.

BACKGROUND: Studies of necrotizing enterocolitis (NEC) are lacking information about NEC Totalis (NEC-T), which is rapidly progressive and almost universally fatal.

OBJECTIVE: To determine clinical and demographic parameters that may predict development of NEC-T compared to NEC non-T in the preterm infant.

DESIGN/METHODS: Newborn and pediatric surgery databases were reviewed from January 1991 through December 2007. Cases (N=39) were defined as having necrosis of >80% of intestines, confirmed by surgery or autopsy. Two to 4 controls with NEC non-T (≥Bell's Stage II) were selected and matched to the case by date of presentation. Data for cases and controls were compared during the 7-day interval before diagnosis, as well as the day of presentation.

RESULTS: Three hundred and twenty eight of 14,075 patients had NEC ≥ Bell's Stage II (2.3%). Thirty nine had objectively diagnosed NEC-T (11.8%). 148 NEC non-T controls were matched. Univariate analyses generated variables for inclusion in a logistic regression model. Statistically significant findings are shown.

Significant risk factors for the development of NEC-T as compared to NEC non-T

		Odds Ratio	95% CI	P-value
Demogaphics	Hispanic (y v n)	3.72	1.3-10.3	0.017
	Lower maternal age	0.94	0.89-0.99	0.03
Feedings	Incr. calories achieved	1.49	0.99-1.32	0.05
	Incr. enteral total fluids achieved	1.01	1.003-1.23	0.008
	Decr. # of days feeds held >once	0.28	0.14-0.56	0.0004
	Full feeds ever (y v n)	3.16	1.25-7.99	0.015
Physical exam on day of dx	Abd. distention	5.05	1.18-21.56	0.029
	Abd. discoloration	6.97	3.10-15.65	<0.0001
	Abd. tenderness	2.09	1.01-4.34	0.047
	Bilious output (v no output)	2.67	1.335-5.32	0.006
Xray findings on day of dx	Ileus	3.75	1.67-8.41	0.0013
	Portal venous gas	18.08	6.25-52.29	<0.0001

Risk factors that were not significantly different include sex, race, BW, IUGR and delivery room complications. Pre-diagnosis clinical findings were not significantly different.

CONCLUSIONS: We detected differences between the NEC-T and NEC non-T preterm population. However lack of a difference in pre-diagnosis clinical findings reflect the difficulty in identifying patients who will succumb to their disease rapidly, despite full intervention.

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Fellow in Training

11:00 AM

Pilot Study of Antibiotic Usage across Four NICUs for Early and Late Onset Sepsis

Haritha Vellanki, Sameer J. Patel, Theoklis Zaoutis, Pamela Douglas-Fontello, Luis Alba, David A. Paul, Lisa Saiman.

Pediatrics, Thomas Jefferson University School of Medicine, Philadelphia, PA; Pediatrics, Columbia University, NY, NY; Center for Interdisciplinary Research to Reduce Antimicrobial Resistance, Columbia University, NY, NY; Pediatrics, The Children's Hospital of Philadelphia; The University of Pennsylvania School of Medicine, Philadelphia, PA; Pediatrics, Christiana Care Health Services, Christiana Hospital, Newark, DE.

BACKGROUND: Antibiotic resistance has emerged in the NICU due to prolonged and frequent use of broad spectrum antibiotics. While antibiotic usage is common, Antibiotic Stewardship Programs and studies of prescribing practices are infrequent in the NICU setting.

OBJECTIVE: To prospectively study antibiotic prescribing patterns for early and late onset sepsis in the NICU.

DESIGN/METHODS: Data were prospectively obtained as part of a larger study of antibiotic stewardship in four tertiary care NICUs. Eligible infants were hospitalized 4 or more days during the period May - October 2009. Study variables included initiation of antibiotics < 72 hrs of age (early onset sepsis) vs. ≥ 72 hrs of age (late onset sepsis), choice of antibiotics, duration of treatment and culture results.

RESULTS:

Patient Demographics

	Site #1	Site#2	Site#3	Site#4	Total
Number of infants	381	276	225	216	1098
Mean Birth Weight(grams)	2293	2254	2308	3072	2404
BW >2500gms(n)	144	120	77	122	463

During this pilot study, 1098 infants were enrolled of whom 681 (62%) were treated for early onset sepsis. Most (636, 93%) were treated with ampicillin and gentamicin with a mean duration of 3.7 days. In all, 215 (32%) were treated for 4 or more days, but only 6 (2.8%) of these infants had positive cultures. Group B streptococci, *E. coli* and *Listeria* were isolated from 2, 1 and 1 infants respectively. In contrast, 152 infants (14%) were evaluated for late onset sepsis which included 200 total courses and vancomycin and gentamicin were initiatiated in 188 (94%)courses. The mean duration of antibiotics in these 200 courses was 6.1 days. One hundred (50%) courses were 4 or more days, in which a pathogen(s) was identified in 35 (35%). Coagulase negative staphylococci was the most common pathogen (n=20), followed by gram negative rods (n=10), *S. aureus* (n=6) and enteroococcal spp. (n=3).

CONCLUSIONS: In this pilot study, one third of the antibiotic courses intiated for early onset sepsis and half of the courses for late onset sepsis were continued for 4 or more days. However, a minority of these courses were guided by positive cultures. Future studies will assess the variability of prescribing practices and opportunities for antibiotic stewardship. Funded by NIH-R01 NR010821-01

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11:15 AM

Decrease in Percutaneous Catheter Infection after Nosocomial Infection Control Measures in Level 3 NICU

Sulaiman Sannoh, Linda Wicker, Vishwanath Bhat, Zubair Aghai, Kee Pyon, Nicole Kemble, Judy Saslow, Sonia Imaizumi, Gary Stahl.

Pediatrics, Children's Regional Hospital, Cooper University Hospital, Camden, NJ.

BACKGROUND: Advances in perinatal-neonatal medicine have led to improved survival of sick and low birthweight neonates. These neonates need vascular access for parenteral nutrition, antibiotic administration and other life saving measures. Percutaneously inserted central venous catheters (PICC) are widely used in many NICU. There are many complications associated with PICC use, such as dislodgment, occlusion, thrombosis and infection. Catheter-related blood stream infection is a major life threatening complication in neonates. Several interventions have been implemented to decrease PICC infections with variable success rates.

OBJECTIVE: Compare PICC infection rates before and after nosocomial infection control measures.

DESIGN/METHODS: A retrospective study conducted at a level III NICU to compare PICC infection rates before (1998-2003) and after (2004-2008) nosocomial infection control measures, including reorganization of NICU infection control task force, hand washing campaign, IV practice guidelines with sterile techniques for IV insertion and maintenance, sterile techniques for hanging intravenous fluid, implementation of mandatory infectious disease RN staff education, having certified PICC team and PICC insertion checklist. Statistical analysis: T-test to compare means and Chi squares for ratios using SPSS 12.0. P< 0.05 was significant.

RESULTS: There were 314 and 282 neonates with 443 and 398 PICCs in pre-intervention and post-intervention periods respectively. Neonates in post-intervention period were sicker based on their prolonged length of stay, more ventilation days and prolonged use of PICC lines. PICC infection rate decreased significantly after intervention from 15/1000 to 4/1000 catheter-days, p<0.05.

CONCLUSIONS: There was significant decrease in PICC infection after nosocomial infection control measures. Having a well coordinated PICC team is essential in every high acuity NICU.

Table1. Demographic and Clinical Characteristics of the Neonates

	Pre-Intervention (314)	Post-Intervention (282)
Birth weight (g)	1210 ± 738; 1060 [680-1375]	1309 ± 730; 1077 [835-1617]
BW < 1500 g	75% (237)	72% (204)
GA (weeks)	29 ± 4; 28 [23-41]	29 ± 4; 28 [23-41]
Male	56% (178)	58% (163)
C/S	47% (149)	50% (141)
Outborn	15% (47)	9% (26)
SGA	11% (33)	11% (32)
PIH	57% (175)	46% (131)
Maternal Fever	5% (15)	4% (10)
Apgar <7 @ 5 min	27% (84)	19% (54)
BPD	32% (99)	30% (85)
ROP	11% (33)	15% (42)
NEC	6% (19)	4% (10)
IVH grade ≥ III	6% (20)	11% (30)
Ventilator days *	21 ± 22; 15 [1-113]	29 ± 34; 17 [1-230]
LOS (days) *	59 ± 36; 56 [1-235]	69 ± 48; [1-353]
PICC days *	18 ± 16; 14 [1-101]	21 ± 17; 15 [1-80]
PICC infections *	15/1000 catheter-day	4/1000 catheter-days
Mortality	11% (34)	9% (25)

* P <0.05 Mean ± SD; Median [range]; (n)

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Fellow in Training

11:30 AM

Feeding Difficulties in Infants with Hypoxic Ischemic Encephalopathy (HIE) Treated with Selective Head Cooling (SHC)

Erlita Gadin, Susan Adeniyi-Jones, Shobhana Desai.

Neonatology, Thomas Jefferson Univ/duPont Hospital for Children, Philadelphia, PA.

BACKGROUND: There is very little published literature on the achievement of feeding milestones in infants with HIE after SHC. Lack of oromotor abilities put these infants at risk for growth failure and may adversely affect their developmental outcome.

OBJECTIVE: 1) To describe the natural course of feeding in infants with HIE post SHC. 2) To examine factors contributing to feeding failure and 3) to evaluate the presence of MRI abnormalities in HIE infants with feeding dysfunction.

DESIGN/METHODS: Retrospective data analysis for all infants treated with SHC at TJUH from 11/2006-03/2009. Demographic data, perinatal course, feeding milestones, and MRI studies were noted. The cohort was divided into infants who achieved successful oromotor skills (SOS), defined as the ability to take optimal oral feeds by 2 months, and infants with feeding dysfunction (FD), defined as the inability to attain successful oral skills and need for long-term gavage feeding (G-tube/NG). The groups were compared using an unpaired Student's *t* test. Results are shown in the table.

RESULTS:

Infant Characteristics And Feeding Milestones [mean±sd]

	SOS (n=68)	FD (n=12)
GA (wks)	39±1.7	39±1.6
BW (g)	3257±548	3233±410
1 min Apgar	1±2	1±1
5 min*	3±2	2±2
10 min*	5±2	3±2
Initial pH*	6.98±0.18	6.81±0.2
Base deficit*	-17.5±7.3	-24±4
Lactate	91±63	125±61
LOS (d)*	19±11	64±23
Initiation of Feeds* †	5.6±2.9	8.8±4
Full Feed*†	10.2±4.8	18.9±4.6
Start Oral*†	9.9±7.3	36±21.2
Ad lib†	14.8±10.6	

* denotes p<0.03. †values reflect age (days)

80 surviving infants formed the study sample. 34/68 (50%) SOS infants had normal MRI. In 3 (4%) basal ganglia/thalamic ischemia were noted. 18 (26%) had white matter abnormalities, 12 (18%) had global injuries, and 1 (2%) had an intraparenchymal bleed. Among the FD infants (n=12), 2 were discharged on NG feeds and 10 were discharged with G-tube. These infants underwent G-tube placement an average age of 46 days. MRI abnormalities noted involved global (58.3%) and white matter (16.7%) ischemia. 3/12 had normal MRI.

CONCLUSIONS: The majority of infants with HIE treated with SHC achieve successful oral feeding skills. However, 15% have feeding dysfunction. The presence of feeding dysfunction is associated with increased resource utilization, which is reflected by the need for gastrostomy tube placement and prolonged hospitalization.

202 Fellow in Training

11:45 AM

Are Temporal Artery and Axillary Temperatures Accurate for Clinical Decision-Making in the Well Baby Nursery?

Michael Bruno, Amy Mackley, John Stefano, Robert Locke.
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BACKGROUND: Temperature variations of 0.5°C may have clinical care implications in newborns. The accuracy of axillary (AT) and temporal Artery (TAT) measurements compared to rectal (RT) measurements in the newborn nursery has not been established.

OBJECTIVE: To determine the accuracy of the axillary and temporal arterty measurements in stable health newborns of ≥ 35 weeks gestation during the first day of life.

DESIGN/METHODS: AT, TAT, RT were obtained at the same time in 100 clinically stable infants ≤ 24 hrs age on a well baby floor. Bland-Altman analysis for comparative accuracy and clinical predictive values for the detection of hyper/hypothermia were determined, using RT as the gold standard.

RESULTS: Accuracy of Axillary vs Rectal: 2*SD variance demonstrated that AT that ranged from 0.6 above to 0.4°C below RT measurement. Accuracy of Temporal Artery vs Rectal: 2*SD difference of TAT vs RT ranged from 0.8 degrees above axillary to 0.6 degrees below RT measurement. Table 1: Clinical reliability in using AT or TAT compared to RT with respect to the detection of hypo and hyperthermia.

Clinical Reliability of Axillary and Temporal Artery Temperatures

Rectal Temp Value =	Hypothermia <36.5°C		Hyperthermia › 37.5°C	
	Axillary	Temporal Artery	Axillary	Temporal Artery
PPV	2%	0%	50%	0%
NPV	98%	97%	96%	95%
Sensitivity	33%	0%	20%	0%
Specificity	96%	98%	99%	91%

CONCLUSIONS: Compared to the gold standard of rectal thermometry, axillary or temporal artery thermometry demonstrated variability than may exceed clinical acceptable standards. For both axillary and temperature artery temperature, the mean values measured by AT and TAT had two standard of deviations > 0.5°C. The sensistivity and postive predictive value of axillary and temporal artery temperatures to detect hypo- or hyperthermia compared to rectal thermometry remains low. This raises the concern that axillary and temporal artery thermometry may be unacceptable as a screening tool for detection of temperature abnormalities and subsequent clinical decision determinations in the newborn time period. There was not consistent enough variation for either the AT or TAT to be used with a "correction factor".

Neonatology - Pulmonary Injury Platform Session

Sunday, March 28, 2010
9:45 AM-12:00 PM

203 Post-Baccalaureate

9:45 AM

Hyperoxia Induced NFκB Activation Alters the Expression of Rev-ERBα and Differentiation of Mouse Lung Fibroblasts

Maurice D. Hinson, Guang Yang, Ping La, Clyde A. Wright, Phyllis A. Dennery.
Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA; Pediatrics, University of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: The transcription factor NFκB modulates inflammatory and oxidative stress. Neonatal mice lacking the NFκB subunit, p50 (KO), demonstrate significantly impaired alveolarization and increased susceptibility to hyperoxia-induced lung injury compared to wild type (WT) controls. They also have an 11-fold decrease in lung steady-state mRNA for Rev-ERBα, which is a key regulator of the circadian clock and cell differentiation. Hyperoxia initiates the transdifferentiation of lipofibroblasts to myofibroblasts and the former play an intricate role in lung development and injury repair by mobilizing lipids used to synthesize surfactant.

OBJECTIVE: We sought to establish a link between hyperoxia induced NFκB activation, and Rev-ERBα mediated lipofibroblast differentiation.

DESIGN/METHODS: Mouse lung fibroblasts (Mlg) infected with an empty vector (CT) or a p50 specific lentiviral small hairpin RNA (SHp50) to silence p50, and uninfected cells were exposed to normoxia (21% O2, 5% CO2) or hyperoxia (>95% O2, 5% CO2) for 24 hrs. The mRNA levels were determined by RT-PCR. Cell proliferation was assessed by Bromodeoxyuridine uptake and cell death by trypan blue exclusion. Putative NFκB binding regions on Rev-ERBα was determined by UCSC Genome Bioinformatics and R-Vista. Serum shock of cultured Mlg cells was used to induce circadian expression. Electrophoretic Mobility Shift Assay and Chromatin Immunoprecipitation determined NFκB binding to DNA.

RESULTS: Exposure to hyperoxia resulted in a 2-fold increase in Rev-ERBα mRNA and a 6-fold increase in BMAL mRNA, a downstream circadian target of Rev-ERBAα. Also, a 4-fold decrease in adipocyte differentiation related protein mRNA, a 2-fold decrease in T cell antigen 1 mRNA, and a 4-fold increase in αactin mRNA was demonstrated, suggesting transdifferentiation to a myofibroblast phenotype. Following hyperoxia, SHp50 cells demonstrated increased Rev-ERBα and decreased cell proliferation and survival (n=3, p<.05 for all experiments). Serum shock induced NFκB binding 4.5 kbp upstream of the Rev-ERBα promoter.

CONCLUSIONS: We demonstrate that Rev-ERBα is regulated by NF-kB and that upregulation of this gene in hyperoxia is associated with transdifferentiation of fibroblasts. We speculate that NFκB plays a crucial role in modulating lung fibroblast differentiation; thereby, modulating lung injury via Rev-ERBα.

204 Undergraduate Student

10:00 AM

Nitric Oxide Inhibits NF-κB Regulated Adhesion Molecule Expression in Human Neonatal Pulmonary Endothelial Cells Exposed to Hyperoxia

Fadeke Agboke, Amal P. Fernando, Ping La, Guang Yang, Phyllis A. Dennery, Clyde J. Wright.
Div. of Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA; Dept. of Pediatrics, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: In the preterm infant, bronchopulmonary dysplasia is common and leads to long-term morbidity. Randomized trials have shown nitric oxide prevents BPD in some infants. The mechanism of this protection remains unclear. The transcription factor NF-κB regulates the cellular response to oxidant stress, and NO is known to inhibit NF-κB activation in adult pulmonary endothelial cells. The role of NO in modulating NF-κB activation in response to oxidant stress in the newborn lung remains unknown.

OBJECTIVE: Using neonatal human pulmonary microvascular endothelial cells (HPMEC), we sought to evaluate the effect of NO plus hyperoxia on NF-κB activation.

DESIGN/METHODS: HPMEC were exposed to 24 or 48 hrs hyperoxia (O2, >95%), nitric oxide (NO, 20 ppm), or both NO and O2 (NO/O2). Cytosolic and nuclear extracts, and mRNA was isolated. Cytosolic levels of the NF-κB inhibitory protein IκBα, ICAM-1, VCAM(both NF-κB targets) and nuclear levels of p65 were determined by Western analysis. Nuclear protein NF-κB consensus sequence binding was evaluated by electrophoretic mobility shift assay(EMSA). Real-time PCR for ICAM-1 was performed. Apoptosis was evaluated by measuring caspase-3 activity, cell death by trypan blue exclusion, and cellular proliferation by BrdU ELISA. Experiments were performed in duplicate and repeated 3 times.

RESULTS: After 24 hr, levels of IκBα in O2 exposed cells were significantly lower vs. NO/O2(p<.05). In cells exposed to O2, nuclear NF-κB consensus sequence binding was significantly increased at 24 hrs(p<.001), and abrogated by exposure to NO/O2. ICAM-1 mRNA and protein levels were significantly higher(p<.05 and p<.001) in cells exposed to O2, while cells exposed to NO/O2 showed no increase in ICAM-1 protein and significant decreases in mRNA(p<.001) vs. control. Cells exposed to O2/NO(48 hr) showed significant decreases in caspase-3 activity(p<.05) and cell death as measured by trypan blue exclusion vs. O2(p<.05). Finally, cellular proliferation inhibited by hyperoxia(p<.05) was rescued by concurrent exposure to NO.

CONCLUSIONS: NO prevents hyperoxia-induced NF-κB activation in HPMEC, resulting in less adhesion molecule expression and decreased cellular toxicity. Through inhibition of this important pro-inflammatory pathway and its effect on dysregulated proliferation, nitric oxide may provide protection to the neonatal lung exposed to oxidant stress.

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10:15 AM

Neonatal Hyperoxia Increases Leukotriene B_4 (LTB_4) Production in Room Air Recovered Adult Mice

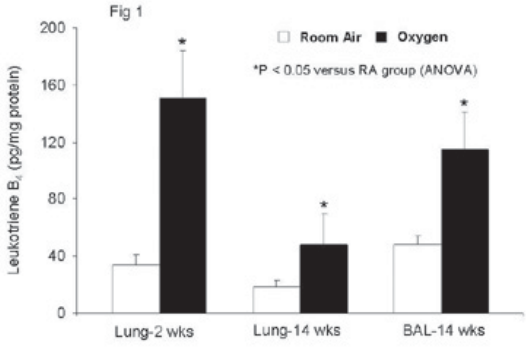
Vasanth H. Kumar, Serguei V. Kishkurno, Lori Nielsen, Huamei Wang, Rita M. Ryan.
Dept of Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Prolonged exposure of newborn mice to *in* vivo hyperoxia leads to lung changes similar to infants with bronchopulmonary dysplasia (BPD). Many of these infants have abnormalities of pulmonary function. We have previously shown that neonatal hyperoxia exposure significantly increases airway hyper responsiveness (AHR) at baseline and following methacholine challenge in 12 week old mice (E-PAS 2009:3859.160).

OBJECTIVE: We hypothesize that increased leukotriene production might contribute to *AHR* in adult mice recovered in room air (RA) following neonatal hyperoxia exposure.

DESIGN/METHODS: On postnatal day 3, newborn mouse litters were randomized to 85% O_2 or RA for 12 days. On day15 half of the mice litters in both the groups were sacrificed and the other half was recovered in RA until sacrifice at 14 wks of age. Leukotriene B_4 (LTB_4) and cysteinyl leukotrienes (CysLTs) were assayed in whole lung and in bronchoalveolar lavage (BAL) by competitive EIA (Cayman Chemicals, Ann Arbor, MI). Results were analyzed by ANOVA.

RESULTS: LTB_4 was significantly higher in the lung both at 2 weeks and at 14 weeks of age.



Lung CysLTs was also significantly higher after neonatal hyperoxia at 2 weeks (70.2 (SD 20) pg/mg protein vs. 27.2 (28) in the RA group) but not significantly so at 14 weeks (139 (187) vs. 135 (226)). LTB_4 was elevated in BAL at 14 weeks (Figure 1) but BAL CysLTs was unchanged between the groups (48 (100) vs. 36 (38) in the RA group).

CONCLUSIONS: LTB_4, a potent mediator of inflammation was significantly elevated in the lung long after hyperoxia exposure. High oxygen exposure in the newborn period may permanently predispose the lung to inflammation and may trigger AHR to agents such as methacholine. We speculate that the duration and severity of early oxygen exposure predisposes the lung to inflammation and airway hyper responsiveness in childhood.

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10:30 AM

Heme Oxygenase-1 Is Important in Lung Recovery after Neonatal Mice Exposed to Hyperoxia

Guang Yang, Tiangang Zhuang, Phyllis A. Dennery, Qing Lin.

Neonatology/Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA; Pediatrics, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: The inducible form of heme oxygenase (HO-1, encoded in the HMOX-1 gene) is highly expressed in neonatal mice lung as compared to adults. We have previously shown that adult null mutant HMOX-1 mice are not more susceptible to hyperoxic injury than WT. It is not known whether disruption of HO-1 affects neonatal hyperoxic lung injury since the newborn lung has high levels of HO-1 and neonatal lung cells are actively proliferating.

OBJECTIVE: To determine whether HO-1 regulates lung morphology and gene expression in the developing lung exposed to hyperoxia.

DESIGN/METHODS: Littermates of HMOX-1 (+/+) and (-/-) neonatal mice (<12h old) were exposed to hyperoxia for 72 h. Some pups were allowed to recover in room air for up to 2 weeks. Lungs were collected for mRNA, protein and lung slices were evaluated for lung architecture by radial alveolar counts (RAC). Levels of surfactant protein, SPA, SPB, SPC and SPD, mRNAs were measured using qRT-PCR. The abundance of genes belonging to cell cycle regulation and associated pathways was assessed using a cell cycle array (PAMM-020, SABiosciences).

RESULTS: Absence of HO-1 protein in the neonatal lung was verified by Western analysis while endogenous HO-2 expression was unchanged. In hyperoxia, HO-1 protein levels did not increase in the HMOX-1 (+/+) lung as compared to age matched air exposed controls. RAC and cell cycle genes (ccna2, ccnb2 and Ki63) were similarly decreased in HMOX-1 (+/+) and (-/-) lung after hyperoxia whereas DNA damage response genes (Ddit3, 14-3-3 sigma, Npm2 and p21) were similarly increased between the two groups. However after room air recovery, RAC was worsened and mRNA levels of SPA, SPB, SPC and SPD were decreased in the HMOX-1 (-/-) compared to the HMOX-1 (+/+). While 44 cell cycle genes were moderately decreased (2 fold) in the HMOX-1 (+/+) lung, these genes were altered by 10-500 fold in the HMOX-1 (-/-) lung.

CONCLUSIONS: In the neonatal mouse, although HO-1 does not play a significant role in a 3-day hyperoxic exposure, it modulates lung architecture, surfactant and cell cycle gene expression in the recovery from hyperoxia.

207 Fellow in Training

10:45 AM

Biphasic Pattern of Inflammatory Response in Neonatal Mice Exposed to Inhaled LPS

Ogechukwu R. Menkiti, Huayan Zhang, Honghong Sun, Junjei Mei, Yuhong Liu, George S. Worthen.

Children's Hospital of Philadelphia, Philadelphia, PA; Hospital of University of Pennsylvania, Philadelphia, PA.

BACKGROUND: At birth, the neonate transitions from a sterile environment to one in which irritants and pathogens are inhaled. The initial response to pathogens involves activation of the innate immune system which regulates inflammation. While the magnitude and quality of this response is crucial, termination of this process in a timely fashion is also critical for survival. While the neonate has been described as immunodeficient, little is known about control of inflammation at this crucial age.

OBJECTIVE: Define the inflammatory response to inhaled LPS induced lung injury in neonatal mice.

DESIGN/METHODS: Neonatal C57/B6 mice were exposed to 0.3mg/ml concentrations of aerosolized LPS on post-natal age 3, 5,7,10,14 and 21 (n≥4). Controls were age appropriate unexposed mice. These mice were sacrificed at 0,2,4,8 and 24 hours post exposure. Broncho-aveolar lavage (BAL) and whole lung tissue samples were obtained. Samples were used to determine patterns of intrapulmonary neutrophil (PMNL) recruitment, chemokine/cytokine levels in lavage fluid and quantification of mRNA levels for cytokines/chemokines via real time PCR of whole lung tissue. Chemokines and cytokines of interest include TNF α, IL-6, G-CSF, Mip-1β, Mip 2 and KC.

RESULTS: While day three mice demonstrated rapid intrapulmonary neutrophil recruitment as early as 4 hours post exposure (neutrophils count 40% of total leukocyte in BAL). Day seven recruitment was slower with 8% neutrophil ($P<0.05$) at 4 hrs and 32% neutrophil accumulation at 24 hrs. Lowest neutrophil accumulation at 24 hours (23%) was noted on day 5 (day 3 versus 5 $P<0.01$). The day 14 response was significantly higher, and adult type response was reached by 21 $P<0.001$. Compared to adults, day 3 mice had equal or higher levels of inflammatory proteins in lavage $P<0.01$. Lowest levels were noted at day 7 (day 3 versus 7 $P<0.001$) with a corresponding increase by day 14. In contrast, the relative quantity of lung mRNA expression was highest in day 3 and 7 mice, and lowest on day 14 ($P<0.01$).

CONCLUSIONS: In this model of LPS-induced lung inflammation, neonatal mice demonstrated a biphasic inflammatory response with a nadir at day 7. Our data demonstrates that pathways involved in signal transduction for bacterial products acting via TLR4 are intact in neonatal mice from day 3. We therefore speculate that post-transcriptional mechanisms regulate synthesis of cytokines and chemokines in complex fashions in neonates

208 Medical Student

11:00 AM

Duration of Birth Hyperoxia Alters Levels of T-Lymphocytes in the Lungs of Month-Old Sprague-Dawley Rats

Angeline Seah, J. Craig Cohen, Shetal Shah.

Pediatrics/Neonatology, Stony Brook University School of Medicine, Stony Brook, NY.

BACKGROUND: Hyperoxia causes excessive oxidant stress, inflammation, lung destruction and leads to simplified alveolarization, apoptosis and disrupted vascularization, leading to chronic lung disease. In rat pups, birth hyperoxia downregulates Toll-Like Receptor 4 (TLR4) – a potent T-cell signaling protein – at adulthood.

OBJECTIVE: To determine the effect of duration of birth hyperoxia on the long-term levels of CD3, CD4, CD8, CD14 and CD45 T-lymphocytes in the lungs of Sprague Dawley rats.

DESIGN/METHODS: Four litters of time-pregnant Sprague-Dawley rats were subjected to equivalent doses of hyperoxia at birth over three durations (47% for 3 days, 60% for 2 days, and 100% for 1 day) and subsequently recovered in room air. At one month of age, lungs were harvested and immuno-histochemistry was performed on frozen sections to assay for levels of CD3, CD4, CD8, CD14 and CD45. Pixel count was used for quantification and 20 microscopic images per antibody were obtained. One way ANOVA testing with Bonferroni Correction and linear regression for trend analysis using GraphPad software were used to determine significance.

RESULTS: CD3 levels were significantly altered after hyperoxia exposure ($p<0.007$). Compared with the 100% hyperoxia group, CD3 levels were decreased after two and three days of hyperoxia ($p<0.05$ respectively). Trend analysis demonstrated decreased CD3 levels with increased duration of hyperoxia exposure ($p<0.01$ Linear Regression). CD4 levels were increased in the 100% hyperoxia groups ($p<0.05$) and decreased linearly with increased oxygen duration ($p<0.004$ Linear Regression). CD4 levels in the 100% hyperoxia group were higher than those exposed to 3 days of hyperoxia at 47%. CD8 Levels were increased in the 100% and 47% hyperoxia groups ($p<0.001$, $p<0.01$ respectively). CD14 levels were decreased in all hyperoxic groups compared to control ($p<0.05$). Levels of CD45 were increased in the 60% oxygen groups compared to the 47% oxygen group ($p<0.03$).

CONCLUSIONS: Hyperoxia at birth increases the number of naïve and mature T-Cells in the lungs of Sprague Dawley rats, as well as affecting levels of the TLR4-complex protein CD14. These changes in T-cell subsets in the lung may be related to duration of hyperoxia exposure, independent of cumulative oxygen exposure. We speculate hyperoxia-induced inflammation in the lung increases naïve and T-cell recruitment via a TLR-4-independent pathway.

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11:15 AM

CXCL5 Regulate Chemokine Scavenging and Pulmonary Host Defense to Bacterial Infection

Junjie Mei, Yuhong Liu, Michael Favara, Ning Dai, Samithamby Jeyaseelan, Janet S. Lee, G. Scott Worthen.

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BACKGROUND: The chemokine sink hypothesis for erythrocyte DARC during inflammation has received considerable attention, but lacks direct in vivo evidence. The exact role of DARC in neutrophil influx to inflamed tissues is not yet clear. CXCL5 is one of the ELR+ CXC chemokines which constitute a family of ligands essential for neutrophil influx into inflamed tissues, but whether CXCL5 serve critical or redundant roles in lung inflammation and infection is not fully understood.

OBJECTIVE: To determine the roles of CXCL5 in pulmonary inflammatory responses to inhaled LPS and E.coli, and chemokine scavenging through erythrocyte DARC.

DESIGN/METHODS: CXCL5-deficient mice were generated with gene targeting technology. Wild-type and CXCL5-/- mice were used to determine the role of CXCL5 in chemokine scavenging, pulmonary responses and host defense in LPS inhalation and E.coli pneumonia model.

RESULTS: CXCL5 binds erythrocyte DARC with higher affinity than KC and MIP-2, and impairs its chemokine scavenging in blood during inflammation. CXCL5 elevates the plasma levels of KC and MIP-2 at least in part through inhibiting erythrocyte DARC chemokine scavenging, impairing chemokine gradients and leading to decreased neutrophil influx to the lung, increased lung bacterial burden and mortality in a Escherichia coli pneumonia model. In contrast, CXCL5 exerts a predominant role in mediating neutrophil influx to the lung during inflammation following LPS inhalation, due in part to prolonged expression of CXCL5 in the lung as contrasted to transient expression of KC and MIP-2. We found abundant preformed CXCL5 in platelets, and the hematopoietic compartment is essential for homeostatic CXCL5 in blood to impair scavenging, while resident cells are responsible for CXCL5 expression in the lung during inflammation as revealed by bone marrow-reconstituted mice.

CONCLUSIONS: Here we demonstrate the nonredundant, critical but opposing role of CXCL5 in mediating neutrophil influx to the lung in a self-limited LPS inhalation mouse model and a severe E.coli pneumonia model, and that CXCL5 inhibits chemokine scavenging through its homeostatic and high-affinity binding with erythrocyte DARC. This study presents a novel paradigm whereby platelets and red cells alter chemokine scavenging and neutrophil-chemokine interaction during inflammation, and has clear implications for the pathogenesis of acute lung injury and pneumonia.

210 House Officer

11:30 AM

The Effects of Hyperoxia and Lipo-Poly Saccaride (LPS) on Inflammatory Mediators in the Lungs of Sprague-Dawley Rat Pups

Elizabeth Buescher, J. Craig Cohen, Shetal Shah.

Obstetrics and Gynecology, Stony Brook University School of Medicine, Stony Brook, NY; Pediatrics, Stony Brook University School of Medicine, Stony Brook, NY.

BACKGROUND: Supplemental oxygen is a mainstay of neonatal care.Hyperoxia causes short-term inflammation, apoptosis, and increased susceptibility of infection. Hyperoxia alters lung levels of Heat Shock Protein 27, Interleukin 6, Interleukin 8, Interleukin 10, and Tumor Necrosis Factor-Alpha, as well as co-stimulatory molecules of Toll-like Receptors 2 and 4. Neonates infected with gram-negative bacteria undergo a similar pro-inflammatory response. However the interactive effects of both these pro-inflammatory states, which together often occur clinically, has not been well characterized.

OBJECTIVE: To determine levels of known pro-inflammatory markers in the lung and serum of animals treated with both hyperoxia and LPS.

DESIGN/METHODS: Two litters of time-pregant Sprague- Dawley rat pups will be included in this study. Thee days after birth, half of each litter was treated with 5micrograms/kg of LPS via intra-peritoneal injection prior to exposure to 100% hyperoxia in a sealed chamber for 24 hours. Post-intervention pups were sacrificed. Lung tissue and serum from cardiac puncture were obtained. Frozen sections were made and immunohistochemistry will be performed with antibodies for tumor-necrosis factor alpha, toll-like receptors 2 and 4, interleukin 8, 12 and 1Beta. Data will be analyzed by pixelation of the digitzed images and compared using ANOVA testing. P value less than or equial to 0.05 will considered signficant.
RESULTS: Hematoxylin and Eosin Staining reveal incrase neurophil infilatration in both the hyperoxic and LPS lung. Hyperoxia resulted in an increase in TLR-2 ($p<0.05$). The increase in TLR4 with hyperoxia were equivalent to the effect seen in LPS-treated animals ($p<0.01$). Although not significant, both TNF-alpha and IL-8 had increased expression in the hyperoxic state. Levels of IL-1Beta were altered in both the hyperoxic and LPS state, but did not act synergistically ($p<0.001$ for both). IL-10 levels were significantly altered by the combination of hyperoxia and LPS infection.
CONCLUSIONS: Hyperoxia and LPS both act on the TLR receptors in thel ung and induce pro-inflammatory changes. The combination of hyperoxia and LPS infection is not synergistic in inducing excess inflammation based on the cytokines studied. The combination of hyperoia in the context of gram negative infection requires further study of inflammatory mediators in the lung.

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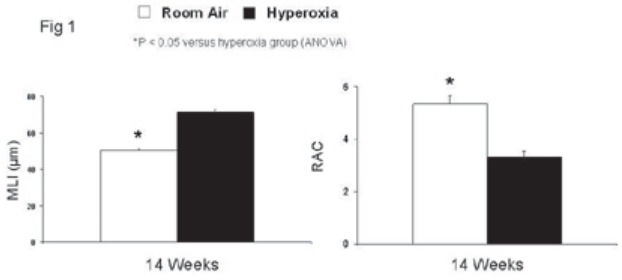
11:45 AM

Alveolarization and Cytokine Responses Are Altered in Adult Mice Exposed to Neonatal Hyperoxia

Serguei V. Kishkurno, Rita M. Ryan, Lori Nielsen, Huamei Wang, Vasanth H. Kumar.

Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Bronchopulmonary dysplasia (BPD), chronic lung disease of prematurity, predisposes to asthma and other respiratory diseases. We hypothesized that neonatal hyperoxia induces lung structural and cytokine changes that persist into adulthood.
OBJECTIVE: We compared alveolarization and several immunoregulatory cytokines at 14wk in mice exposed to neonatal hyperoxia vs. room air (RA).
DESIGN/METHODS: Newborn litters were randomized at 3d to 85% oxygen or RA for 12d. At d15, half were sacrificed and half recovered in RA until sacrifice at 14wk. Lung sections were stained with H&E for histopathology, measurement of radial alveolar count (RAC) and mean linear intercept (MLI). Lung IL-4, IL-10, IL-12 and IFNγ were measured by quantitative sandwich enzyme immunoassay (R&D Systems, Minneapolis, MN).
RESULTS: The hyperoxia group showed alveolar simplification, a significantly lower RAC and higher MLI (alveolar enlargement) both at 2wk and 14wk.



IL-12, a proinflammatory cytokine, and IFNγ were significantly elevated soon after hyperoxia exposure (2wk) but not at 14wk.

	2 weeks		14 weeks	
	Room Air (RA)	Neonatal Hyperoxia	Room Air (RA)	Neonatal Hyperoxia
IL-12	127 (44)	194 (19)*	244 (73)	327 (103)
IFNγ	40 (13)	84 (33)*	337 (125)	235 (117)
IL-10			328 (34)	252 (35)*
IL-4	444 (124)	430 (195)	612 (113)	436 (88)*

data are mean (SD) pg/mg protein; *P<0.05 by ANOVA vs. RA

IL-10 and IL-4 were significantly higher in the RA group at 14wk.
CONCLUSIONS: Exposure to hyperoxia in the neonatal period produced alveolar simplification that persisted despite prolonged room air recovery, suggesting that oxygen may induce permanent lung structural changes. One possible mechanism involves modulating the immune response in the lung. IL-10 and IL-4, cytokines that induce a Th2 cell type, were higher in the RA group. However, a Th1 preference (higher IL-12 & IFN) noted after 2wk hyperoxia did not persist at 14wk. The relationships among oxygen, cytokines and alveolar simplification need to be explored further.

Sunday, March 28, 2010
9:45 AM-12:00 PM

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Fellow in Training

9:45 AM

Transient Disruption of Stretch-Dependent Lung Organogenesis Leads to Altered Postnatal miRNA and Fibrotic Lung Disease Phenotype

Anja Mowes, Erin Killeen, Kirstie Marcello, Craig Cohen, Janet Larson.
Neonatology, Thomas Jefferson Medical College/Nemours, Philadelphia, PA; Pediatrics, Stony Brook University Medical Center, Stony Brook, NY.

BACKGROUND: Transient in utero knockout of CFTR gene in the rat lung has been shown to result in adult onset lung disease. As manipulation during fetal period is not permanent, changes in the adult lung are due to epigenetic changes induced in the fetal period. Recently, microRNAs have become known as important regulators of gene expression. However, little is known of their expression pattern and role in the postnatal lung following transient fetal disruption of lung development.
OBJECTIVE: To examine if phenotypic changes seen following in utero disruption of stretch result are associated with changes in microRNA expression.
DESIGN/METHODS: Individual rat fetuses of timed pregnant mothers were injected with adenovirus encoding either EGFP as a control or anti-sense CFTR on day 15 of gestation. At day of life 5, the lung tissue was harvested and the expression pattern of miRNAs was analyzed with a miRNA microarray (Affymetrix GeneChip microRNA array). Affymetrix miRNA QC tool was used for data summarization, and quality control. Analysis of the data was performed with GeneSifter. The results of each group were further analyzed via paired t-test for significance of down - and up-regulated microRNA. MicroRNA of rat genes was ranked for most significant ratio (>1) and p-value (< 0.05).
RESULTS: The Affymetrix microarray covers 71 organisms with 46.228 probes comprising 7815 probe sets including controls. 352 of these probes are genes from Rattus norvegicus (rno). Out of the 352 rno-miRNAs, 26 of treated rno-miRNAs were significantly up-regulated ($p < 0.05$), and 10 of treated rno-miRNAs were significantly down -regulated ($p < 0.05$) compared to the control group. The most significant up-regulated ratio of 2.07 was seen in rno-miRNA-126. In addition, cluster analysis of non-rat miRNAs showed additional miRNA alterations including the miRNA17-92 complex and miRNA-127.
CONCLUSIONS: We have identified significantly changed expression of several miRNAs after transient in utero knockout of the CFTR gene in the postnatal lung. MicroRNA-127 and 92 of particular interest as these were shown previously to be involved in branching morphogenesis. MicroRNA-126 is associated with VCAM expression. We conclude that transient manipulation of organogenesis results in an altered epigenome by permanent changes of microRNA expression that can subsequently altered levels of proteins that are involved in developmental processes.

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Fellow in Training

10:00 AM

Adult Onset Airway Disease Following Transient Disruption of Fetal Stretch-Induced Differentiation

Kirstie R. Marcello, Erin Killeen, Anja Mowes, Craig Cohen, Janet Larson.
Pediatrics, Thomas Jefferson University Hospital, Philadelphia, PA; Pediatrics, Thomas Jefferson Medical College/Nemours Foundation, Philadelphia, PA; Pediatrics, Stony Brook University Medical Center, Stony Brook, NY.

BACKGROUND: The disruption of stretch in the fetal lung adversely affects normal development. The effects of this fetal disruption on adult lung phenotype remain largely unknown. In addition to external disruption, there is evidence that contractile forces are generated internally by the actomyosin cytoskeleton. Stretch in the developing lung is promoted intrinsically by peristaltic muscle contractions of the embryonic airway. These airway contractions produce mechanical force on the developing airways and parenchyma. We have shown that the transient in utero inhibition of stretch-induced differentiation in the rat lung results in adult onset lung disease. The adult phenotype can be manipulated by the gestational timing and stage of lung development of the fetal treatment.
OBJECTIVE: To determine if in utero disruption of the stretch induced differentiation in the rat lung at 15 days gestation affects adult lung phenotype.
DESIGN/METHODS: Timed pregnant Sprague-Dawley rats at 15 days gestation were treated in utero with varying concentrations of a replication deficient adenovirus containing cystic fibrosis conductance transmembrane regulator (CFTR) gene fragment cloned in the anti-sense direction (ASCFTR). Control animals received control genes EGFP or LacZ. Animals were allowed to deliver and placed in normal vivarium conditions. Pulmonary function testing was performed on the in utero-treated animals at one year of age.
RESULTS: There was a significant difference in airway resistance in the animals that had received the ASCFTR (stretch-disrupting) gene in utero as compared to control animals. The airway resistance was significantly different at PEEP 0 and PEEP 3, but lost significance when the airways became more distended at PEEP 6. When compared to control animals, the ASCFTR treated animals showed no differences in static compliance (Cst), elastance (H), or tissue dampening (G).
CONCLUSIONS: Previous studies demonstrated that disruption of stretch at 16 days gestation results in significant changes in static compliance and elastance. In these studies treatment at 15 days gestation results in changes in airway resistance while changes in the parenchyma, as reflected by static compliance and elastance remained unchanged. These results are further evidence that timing of the gene disruption reflects the stages of lung development. Earlier disruption of lung organogenesis results in more proximal changes in the lung architecture.

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10:15 AM

Using Exercise To Improve Clinical Outcomes in Cystic Fibrosis

Laura A. Barnes, Kathryn A. Carson, Karen von Berg, Holly Loosen, Shruti M. Paranjape.

Eudowood Division of Pediatric Respiratory Sciences, Johns Hopkins University, Baltimore, MD; Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD; Physical Medicine and Rehabilitation, Johns Hopkins Medical Institutions, Baltimore, MD.

BACKGROUND: Cystic fibrosis (CF) is a progressive lung disease leading to deterioration of lung function and exercise capacity. Patients with decreased FEV_1 tend to have decreased body mass index (BMI). Because exercise has been shown to improve both lung function and quality of life, developing a routine exercise program may be beneficial for patients with CF.

OBJECTIVE: The hypothesis of this study was that increasing activity in CF patients with a two-month exercise regimen leads to improved lung function, nutrition, and quality of life.

DESIGN/METHODS: The exercise capacity of CF patients (6-16y) was assessed at the beginning and end of a two-month exercise regimen using the Modified Shuttle Walk Test (MSWT). The MSWT is a reliable measure of exercise capacity in which the subject walks 10m lengths at progressively increasing paces. Routine spirometric (FEV_1) and anthropometric (BMI) data were recorded at both study visits. Two validated surveys, the Habitual Activity Estimation Scale (HAES) and Revised CF Quality of Life Questionnaire (CFQ-R), were administered to record the patient's activity and quality of life. A two-month exercise regimen was recommended by a physical therapist based on the patient's self-reported activity level and consisted of activities chosen by the patient.

RESULTS: Thirty-six patients (26M, 10F) performed the MSWT before and after the two-month exercise regimen. Mean (SD) baseline FEV_1 (% predicted) was 98% (14.3%) at visit 1 and increased 1.6% (10.9%) at visit 2. Mean BMI percentile was 55.3 (20.5) at visit 1 and increased 1.8 (9.2) at visit 2. The mean number of shuttles on the MSWT at visit 1 was 94.9 (28.3) and there was a statistically significant increase of 6.7 (12.6) shuttles at visit 2 (p=0.003). Increasing trends in HAES activity levels and CFQ-R measures were not statistically significant.

CONCLUSIONS: After a two-month exercise program, CF patients showed significant improvement in exercise capacity as well as improving trends in lung function, self-reported activity level, and quality of life. These findings demonstrate that the HAES and MSWT are useful measures of habitual activity and exercise capacity that are easily implemented in the clinic. Future goals are directed toward incorporating these tools into clinical practice to standardize exercise assessment while customizing patient care. Further studies, with longer follow-up to measure clinical improvement, are needed to determine their therapeutic potential.

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10:30 AM

A Comparison of Physical Activity Levels between Asthmatic and Non-Asthmatic Inner City Children

Nita Vangeepuram, Susan L. Teitelbaum, Maida Galvez, Barbara Brenner, John Doucette, Mary S. Wolff.

Community and Preventive Medicine and Pediatrics, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Low-income minority children living in inner cities have higher rates of both asthma and obesity. While physical activity levels are clearly associated with obesity, few studies have looked at asthma diagnosis in relation to level of physical activity.

OBJECTIVE: To study the association between asthma diagnosis and various measures of physical activity and sedentary activity in inner city minority children.

DESIGN/METHODS: Cross-sectional data from Growing Up Healthy, a community based study of 6-8 year old NYC children, were used. Pedometers were utilized as objective tools for assessing physical activity. Participation in physical activities and time spent each day in sedentary activities was reported by parents in a questionnaire. Asthma was defined as parental report of physician-diagnosed asthma. Physical activity and pedometer measurements among asthmatics and non-asthmatics were compared using T-tests.

RESULTS: 505 children were included with 79% female, 26.5% non Hispanic Black, and 73.5% Hispanic. 26% of children had physician-diagnosed asthma. Overall, 67.8% of children had no participation in organized recreational activities. The average time spent in gym class per week was one hour. 46.8% of children had more than two hours per day of sedentary activity (television, video game and computer time combined). Asthmatic children were more likely than non-asthmatic children to report that health problems limited their physical activity (17.4% compared to 1.1%, $p<0.001$). Asthmatic children also had significantly higher total sedentary hours compared to non-asthmatic children (4.6 versus 4.0 hours, p=0.039). There were no differences between asthmatic and non-asthmatic children in mean hours of non-scheduled activities, gym class, sleep, television or mean number of pedometer steps. Proportions of children with any versus no metabolic hours per week of organized physical activity did not vary between asthmatic and non-asthmatic children.

CONCLUSIONS: There were increased levels of sedentary activity in asthmatics compared to non-asthmatics in this sample of inner city minority children. Sedentary activity may lead to increased exposure to indoor environmental asthma triggers and reduce available time for physical activity. Strategies are needed to educate families about the importance of limiting sedentary activities among children with asthma.

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House Officer

10:45 AM

Racemic Albuterol or Levalbuterol, Continuous or Very-Frequent-Intermittent Nebulizations: A Prospective, Randomized Controlled Study in Children with Status Asthmaticus

Mimily Harsono, Partha Chatterjee, Won Baik-Han, Susana Rapaport, Rusly Harsono.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Pediatrics, Jamaica Hospital Medical Center, Jamaica, NY.

BACKGROUND: Controversy exists regarding the appropriate type, frequency and dose of short acting beta-2 agonist (SABA) nebulization (NEB) in children with status asthmaticus (SA).

OBJECTIVE: To compare the efficacy of racemic albuterol (RAC) and levalbuterol (LEV) NEB delivered either through continuous (CON) or very-frequent-intermittent (INT) NEB methods in children with SA.

DESIGN/METHODS: We prospectively enrolled children from 0 to 18 years with bronchial asthma admitted for SA in two urban community hospital pediatric units from June to November 2009. Consents and assents were obtained. Participants were randomized into one of the 4 groups: RAC CON NEB (cRAC), LEV CON NEB (cLEV), RAC INT NEB (iRAC), LEV INT NEB (iLEV). Demographic data, pediatric asthma symptom severity (PASS) scores, vital signs, electrolytes, length of hospital stay (LOS) and respiratory time (RT) for the groups were collected. Our primary outcome measurements were PASS score at different interval of hospitalization following SABA NEB. Secondary outcome included RT, LOS, changes in vital signs and electrolytes.

RESULTS: Forty seven children completed the study: cRAC (11), cLEV (13), iRAC (11) and iLEV (12). The duration of high-dose SABA NEB was (hours): cRAC (9.1 ± 4.4), cLEV (11.7 ± 6.2), iRAC (27.8 ± 21.1) and iLEV (12.7 ± 5.6). Average SABA dose (mg LEV/hr) was higher in CON groups: cRAC (2.5 ± 0.1), cLEV (2.9 ± 1.6), iRAC (0.5 ± 0.1) and iLEV (0.6 ± 0.1) ($p<0.01$). Following treatment, the improvement of PASS score at 12 hours and 24 hours for all groups was: cRAC (51.1%, 64.8%), cLEV (41.2%, 57.2%), iRAC (50.6%, 55.3%) and iLEV (31%, 40.1%) ($p > 0.08$, $p > 0.1$). The LOS was similar in all groups (days): cRAC (3.2 ± 0.4), cLEV (3.9 ± 1.3), iRAC (3.9 ± 1.2) and iLEV (3.8 ± 1.3) ($p > 0.4$). The RT was longer in the INT groups (units): cRAC (2.3 ± 1.1), cLEV (2.9 ± 1.6), iRAC (9.8 ± 6.5) and iLEV (6.3 ± 2.8) ($p<0.02$). After 12 hours of treatment, there was increasing heart rate (HR) in all groups: cRAC (24.6%), cLEV (27.7%), iRAC (18.6%) and iLEV (23.9%) above average resting HR for age group ($p > 0.4$).

CONCLUSIONS: We conclude that with similar nebulization delivery method, both albuterol and levalbuterol are equally effective and safe. Compare to very-frequent-intermittent, continuous nebulization method utilizes less clinical resources and may decrease healthcare cost.

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House Officer

11:00 AM

Macrolide Treatment in Children with Status Asthmaticus: Antimicrobial or Anti-Inflammatory?

Mimily Harsono, Partha Chatterjee, Won Baik-Han, Susana Rapaport, Rusly Harsono.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Pediatrics, Jamaica Hospital Medical Center, Jamaica, NY.

BACKGROUND: Use of macrolide as antimicrobial in reducing symptoms in asthmatic children with Mycoplasma pneumonia (MP) is a common practice. Macrolide's new role as an anti-inflammatory in bronchial asthma has been proposed recently and remains controversial.

OBJECTIVE: To evaluate if macrolide treatment in asthmatic children with and without acute MP would improve their symptom severity.

DESIGN/METHODS: We prospectively enrolled children from 0 to 18 years of age with established bronchial asthma admitted for status asthmaticus (SA) and clinical pneumonia in two urban community hospital pediatric units from June to November 2009. Consent from parent or legal guardian and assent from age appropriate children were obtained prior to the study. Children were randomized into completing either azithromycin or clarithromycin treatment. Acute MP infection was defined by positive specific serology immunoglobulin M (IgM) anti-MP. Demographic data, pediatric asthma symptom severity (PASS) scores, vital signs, length of hospital stay (LOS), and laboratory data were collected. We compared children with SA without MP that did not receive macrolide treatment (control) and four macrolide treatment groups: children with MP that received azithromycin (MP-A) or clarithromycin (MP-C) and children without MP that received azithromycin (nMP-A) or clarithromycin (nMP-C). Our primary outcome measurements were PASS scores at different intervals of hospitalization following macrolide treatment.

RESULTS: We enrolled 172 children and 75 completed the study. At 24 hours following macrolide treatment, there was less improvement in PASS score in all treatment groups: nMP-C (78.6%), nMP-A (69.3%), MP-C (52%) and MP-A (65.1%) compared to control group (85.6%) ($p < 0.02$). At 48 hours, there was marked improvement in PASS score in all treatment groups: nMP-C (97.5%), nMP-A (93.5%), MP-C (96.7%) and MP-A (92.1%) compared to control group (97.5%) ($p > 0.71$). The LOS was (2.4 ± 0.7) days in control group compared to (2.7 ± 1.3) and (3.1 ± 1.1) days in macrolide treated non-MP and MP groups respectively ($p > 0.16$).

CONCLUSIONS: We conclude that macrolide treatment in children with status asthmaticus improves their symptom severity. These clinical improvements strongly suggest both antimicrobial and anti-inflammatory properties of macrolides.

218 Fellow in Training

11:15 AM

Breathing Easy: The Economic Implications of Outdoor Air Pollution and Pediatric Asthma Hospitalizations

Angkana Roy, Perry Sheffield, Kendrew Wong, Leonardo Trasande.
Pediatrics and Preventive Medicine, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Exposure to outdoor air pollutants such as particulate matter of diameter <2.5μm ($PM_{2.5}$) has been associated with numerous markers of increased asthma morbidity. However, the impact of such exposures on health care utilization is largely unknown.

OBJECTIVE: To examine the association between $PM_{2.5}$ exposure and pediatric asthma hospitalization charges

DESIGN/METHODS: We combined national air quality data from the EPA's Aerometric Information Retrieval System with hospital discharge data from the Nationwide Inpatient Sample. We included hospital discharges from 1999-2006 with a primary diagnosis of asthma among children 2-17 years of age. Hospitals with no air quality data within 10 miles were excluded. Our main predictor was average $PM_{2.5}$ concentration in proximity of the hospital during the month of admission. Bivariate analysis was conducted using a Spearman correlation. The outcome variable was then log-transformed and multivariable analysis was conducted, creating a linear regression model. We controlled for other air pollutants known to contribute to asthma severity (O_3, NO_2, and SO_2) as well as patient demographics, hospital characteristics, admission month, and year of hospitalization. Interaction terms for $PM_{2.5}$ with age, income, and month of admission were considered for inclusion in the final multivariable model based on significance $p<0.1$.

RESULTS: Spearman correlation with total hospital charges yielded $r=0.2$ ($p<0.0001$). Multivariable analyses (N=53,879 unweighted) identified no significant interaction terms. In the final model, a 1 unit increase in $PM_{2.5}$ was associated with a 0.0071 increase in log total charges ($p<0.0001$). O_3, NO_2, and SO_2 were not significant predictors. Translated into dollars, a 1 unit $PM_{2.5}$ increase represented a 1.64% or average $117 rise in charges per hospitalization. Extrapolated to the total weighted number of hospitalizations examined in this study (N=272,157), $PM_{2.5}$ represented an annual preventable economic burden of $54.8 million per year.

CONCLUSIONS: $PM_{2.5}$ appears to play a role in increasing healthcare utilization among children hospitalized with asthma. The increase in hospital charges seen with higher $PM_{2.5}$ levels suggests that air pollution reduction efforts may lead to substantial healthcare savings.

219 Fellow in Training

11:30 AM

The Association between Asthma Education and Use of Environmental Control Practices

Angkana Roy, Lauren Steele, Emily Blanchard, Atray Dixit, Juan Wisnivesky.
Pediatrics and Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Internal Medicine and Pulmonary Critical Care, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Asthma morbidity rates in East Harlem, New York are significantly higher than national averages. Indoor environmental triggers may play a role. Many educational interventions have been implemented in East Harlem to improve asthma management. Environmental control practices (ECPs) to reduce indoor triggers have been an area of focus for these interventions.

OBJECTIVE: To examine the association between exposure to different educational interventions and 1) knowledge of ECPs and 2) use of ECPs.

DESIGN/METHODS: Parents of children 2-17 years old with asthma in East Harlem were surveyed. Data regarding knowledge and use of 25 ECPs recommended by the NIH guidelines was obtained. Participants were asked about sources of education regarding environmental control of asthma including: no advice, physician advice only, social work/asthma counselor advice but no home visit, and home visit. ANOVA was used to assess differences among the four groups in mean number of ECPs they knew about and mean number used. Linear regression models were built to control for demographic confounders including race, gender, income, and level of parental education.

RESULTS: We surveyed 129 participants. Mean number of ECPs parents reported knowledge of was 12.8, 16.0, 17.8, and 19.0 ($p<0.001$) for the groups who received no advice, physician advice only, social work advice but no home visit, and home visit, respectively. The mean number of ECPs used was 9.6, 9.8, 10.6, and 11.9 ($p<0.05$) for those same groups. In multiple regression analyses, those with only physician advice knew of 2.5 more ECPs ($p=0.04$), those with social work advice but no home visit knew of 4.6 more ECPs ($p<0.001$), and those with home visits knew of 5.5 more ECPs compared to those who received no advice ($p<0.001$). However, type of intervention was not significantly associated with use of ECPs after adjusting for confounders.

CONCLUSIONS: Intensive interventions such as asthma counselors and home visits appear to result in increased awareness of environmental asthma control, an important step towards improving management. Physician referral to these types of services should be considered. Further research is needed to assess barriers in translating knowledge of ECPs into implementation of these practices in the home.

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11:45 AM

Psychosocial Stress and Asthma: The Role of Neighborhood Safety

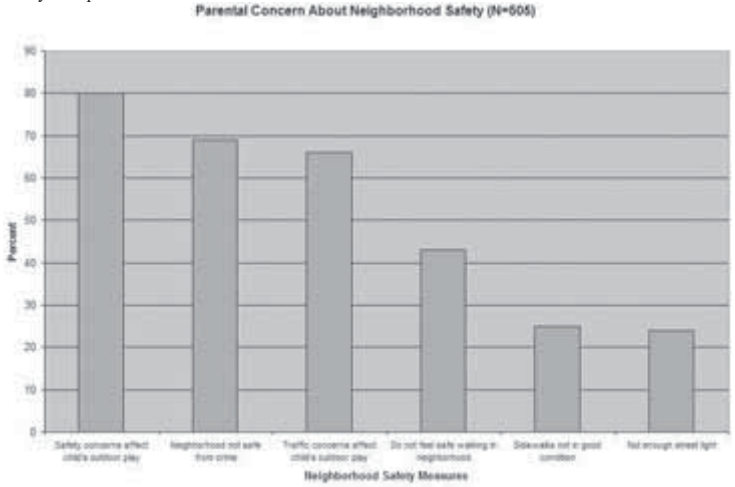
Nita Vangeepuram, Maida Galvez, Barbara Brenner, John Doucette, Mary S. Wolff.
Community and Preventive Medicine and Pediatrics, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Low-income minority children living in inner cities have high rates of asthma. Recent studies have emphasized the role of psychosocial stress in development of asthma. Living in neighborhoods perceived as being unsafe is one potential source of increased stress.

OBJECTIVE: To study the association between parental perception of neighborhood safety and reported asthma diagnosis among inner city, minority children.

DESIGN/METHODS: Cross-sectional data from Growing Up Healthy, a community based study of 6-8 year old NYC children, were used. Asthma was defined as parental report of physician-diagnosed asthma. Parental perceptions of neighborhood safety were assessed with a questionnaire. Associations between perceived neighborhood safety and reported asthma were examined using chi square tests. Multivariate logistic regression analyses were then performed.

RESULTS: 505 children were included with 79% female, 26.5% non Hispanic Black, and 73.5% Hispanic. 26% of children had physician-diagnosed asthma. Parental concern about neighborhood safety is depicted below.



There was a significant association between feeling safe walking in the neighborhood and asthma with 60.1% of parents of non-asthmatic children reporting they felt safe compared to 49.6% of parents of asthmatic children ($p=0.05$). More parents of non-asthmatic children than of asthmatic children reported that their neighborhood was safe from crime (33% versus 25%, $p=0.10$). In multivariate analyses adjusting for race/ethnicity, age, gender, residence in East Harlem, and SES (as measured by people per room in home), parents reporting feeling unsafe walking in the neighborhood were more likely to have a child diagnosed with asthma (OR=1.69, $p=0.027$).

CONCLUSIONS: Psychosocial stressors such as living in unsafe neighborhoods may impact the development of asthma. Addressing the increased asthma burden in certain communities may require interventions to improve neighborhood safety and decrease urban stressors.

General Pediatrics III - Medical Education Platform Session

Sunday, March 28, 2010
9:45 AM-12:00 PM

221 Fellow in Training

9:45 AM

Could Physician Education and Application of Pharmacokinetic Principles Improve Serum Gentamicin Levels in Neonates?

Fadel Balawi, Katherine Han, Gladys El-Chaar, Susana Castro-Alcaraz.
Neonatal-Perinatal Medicine, Schneider Children's Hospital, New Hyde Park, NY; Department of Clinical Pharmacy Practice, St. John's University College of Pharmacy & Allied Health Professions, Queens, NY; Department of Pharmacy, North Shore-Long Island Jewish Health System, New Hyde Park, NY.

BACKGROUND: Therapeutic Drug Monitoring (TDM) is an important tool in devising individualized drug dosing based on pharmacokinetic (PK) calculations. TDM is especially important in neonates given their variable and dynamic physiological states. Pharmacotherapists usually perform TDM; however, when not available, physicians often do not attempt such calculations. A PK education and training program was implemented to teach physicians to perform PK calculations and dosage changes. There are scant data addressing physician education regarding application of PK on drug levels.

OBJECTIVE: To ensure accuracy of PK calculations and dosage changes made by physicians after the educational program and identify barriers in physician PK-derived dosage changes. We hypothesized that TDM performed by physicians after the educational program will result in a greater number of maximum serum (Cmax) gentamicin levels in the therapeutic range.

DESIGN/METHODS: This retrospective chart review included neonates who received gentamicin and had elevated trough serum gentamicin concentrations (SGC) 6 months before and 6 months after implementation of a PK training program to physicians. Trough SGC were used to calculate gentamicin Cmax. Before PK training, dosage changes made by physicians were done by fixed percentages and calculated Cmax levels after these dosage changes were expected to be low. Didactic workshops and one-on-one sessions by the pharmacotherapist were carried out to teach PK-derived dosage calculations. We analyzed the differences in calculations of PK parameters and dosage changes between the pharmacotherapist and physicians after training. A survey was distributed to identify barriers to the physician PK-derived method of dosage adjustments. A sample size of 39 patients in each group was needed to reduce the sub-therapeutic gentamicin Cmax from 50% to 20% with 80% power and a 5% level of significance.

RESULTS: There were 41 courses of gentamicin in each group. Before training, only 26% of calculated Cmax levels were in the therapeutic range. After PK training, this number rose to 100% (p=0.0001). Pharmacokinetic calculations and dosage changes performed by physicians were done correctly. Most common barriers to PK-derived dosage calculations were time to perform calculations and delay in laboratory reporting of SGC.
CONCLUSIONS: PK education of house-staff education was successful and resulted in improved gentamicin levels.

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10:00 AM

Post-Simulation Debriefing Is Crucial to Residents' Disaster Triage Performance and Patient Outcomes

Mark X. Cicero, Jason Zigmont, Marc Auerbach, Kevin Ching, Carl R. Baum.
Pediatrics, Yale University School of Medicine, New Haven, CT; Yale-New Haven Hospital, New Haven, CT.

BACKGROUND: Because of its potential effect on patient outcomes, pediatric disaster medicine (PDM) triage is a critical skill for pediatricians. The ACGME now requires residency disaster training. Ideal training is learner-centered and experiential.
OBJECTIVE: We planned to measure the efficacy of a multiple-victim simulation in facilitating learners' acquisition of PDM skills, including the JumpSTART triage algortithm. We hypothesized that a structured debriefing would improve triage performance.
DESIGN/METHODS: We created a 10-victim school-shooting scenario to facilitate learning a PDM triage algorithm. Victims were portrayed by adult volunteers, and by high and low fidelity simulation manikins that responded physiologically to airway maneuvers. Learners were pediatrics residents at our institution. Pre-course learner knowledge was measured with previously derived psychometrically tested multiple-choice questions. Expected responses were not revealed. After a didactic session, learners assigned triage levels to all victims, and recorded responses on a standardized form. A structured debriefing allowed learners to review the victims and discuss triage rationale. A new 10-victim trauma disaster scenario was presented one week later. Learners again assigned triage levels to victims, and completed a different version of the multiple-choice test. Wilcoxon sign rank tests were used to compare pre-and post-test scores and performance on pre- and post-debriefing simulations.
RESULTS: 51 learners completed the educational intervention. Mean scores on pre- and post-tests improved significantly [p<0.0001], and were 68.8% [range 25-100%,SD 16.8%] and 86.3% [62.5-100%,SD 11%]. Initial triage mean performance was 7/10 patients accurately triaged [5-10,SD 1.3], and after the structured debriefing, mean performance improved [p<0.0001] to 8/10 patients [5-10, SD 1.37]. Over-triage of an uninjured child with special healthcare needs (CSHCN) [67.8% of learners pre-debriefing, 49.0% post-debriefing] and under-triage of head-injured, unresponsive patients [41.2% of learners pre-debriefing, 37.5% post-debriefing] were the most common errors.
CONCLUSIONS: Structured debriefings are a key component to PDM simulation education, and resulted in greater triage accuracy. Our educational intervention improves disaster triage knowledge and skills. Future curricula should emphasize assessment of CSHCN and head-injured patients.

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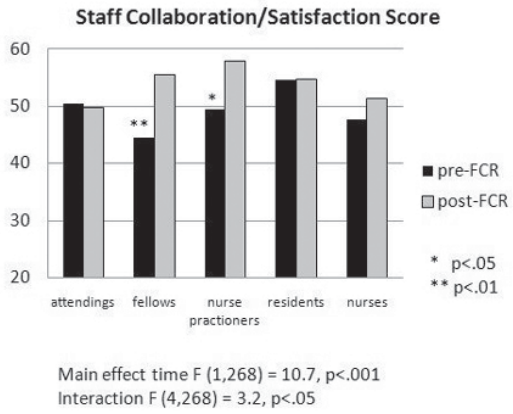
Fellow in Training

10:15 AM

Impact of Implementing Family Centered Rounds (FCR) in a Neonatal Intensive Care Unit

Kristin C. Voos, Anne-Lise Yohay, Gail Ross, Mary J. Ward, S. Nena Osorio, Jeffrey M. Perlman.
Pediatrics, New York Presbyterian Hospital Weill Cornell Medical College, New York, NY.

BACKGROUND: Family-centered care is intended to strengthen the doctor-patient-parent relationship, improve patients and parents experience of health care, and decrease stress. Physician and parent communication skills are associated with improved health status, recall, treatment adherence, and satisfaction. In a previous needs assessment in our NICU, 44% of parents stated that improved physician communication would reduce their stress (Voos, PAS 2009). Redesigning traditional medical rounding practice to FCR is a potential way to address these needs.
OBJECTIVE: To determine if FCR will increase provider satisfaction regarding patient care decisions and parent satisfaction with provider communication.
DESIGN/METHODS: Collaboration and Satisfaction about Care Decisions (CSACD) survey (Biggs 1992) was given to staff on 4 randomly chosen patients 2 days a week for 5 weeks prior to implementation of FCR March 2009 and 6 months after. Parents received a Neonatal Instrument of Parent Satisfaction (DiCenso 1996) before discharge prior to and after starting FCR. A 2-way (pre vs. post X provider code) ANOVA was run with CSACD score as the dependent variable.
RESULTS: 278/288 (97%) staff surveys were completed, 142 pre & 136 post FCR. A significant main effect of time [pre vs post] (p<.001) as well as an interaction effect (p<.05) on staff collaboration and satisfaction was noted. The latter was due to NNPs and fellows, but not other groups.



28/45 parent surveys (62%) were completed, 12 pre & 16 post. Parents' satisfaction scores increased significantly (p< .01) on survey items regarding communication including meeting with physicians and obtaining information about their infant.
CONCLUSIONS: Implementation of FCR has enhanced collaboration among team members predominantly for NNPs and fellows. Since the latter are the primary communicators with parents, this satisfaction may reflect the avoidance of miscommunication due to FCR. This open dialogue may also contribute to the increased parent satisfaction.

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10:30 AM

Satisfaction with Family-Centered Rounds: Perspectives of Families, Nurses, Trainees, and Attending Physicians

David I. Rappaport, Tara A. Ketterer, Vahideh Nilforoshan, Iman Sharif.
General Pediatrics, Nemours/AI duPont Hospital for Children, Wilmington, DE; Residency Program, Nemours/AI duPont Hospital for Children, Wilmington, DE.

BACKGROUND: Family-centered rounds (FCR) involve multidisciplinary rounds with families. FCR may improve family participation and staff satisfaction. In 2006, we implemented FCR on general pediatrics inpatients but noted inconsistent adoption, perhaps due to their perceived length. We sought to study interactions on FCR and their impact on participant satisfaction.
OBJECTIVE: To test the relationship between FCR and 1) duration of rounds and 2) satisfaction of families, trainees, nurses and attending physicians
DESIGN/METHODS: An investigator attended rounds, compiling data using a structured observation tool. After rounds, all participants, including families, completed an anonymous satisfaction survey. Family satisfaction data was linked to patient observation data. We defined 'FCR' as rounds with a parent and nurse present. We used Spearman's correlation to test the relationship between FCR and time rounding. Using chi-square we compared the link between family satisfaction questions and FCR. We also tallied an overall family satisfaction score and compared median satisfaction with FCR. Staff data was linked to the day of observation. For each day, we recorded the proportion of patients receiving FCR. We used Spearman's correlation to test the relationship between FCR and staff responses. For nurses, we summed responses to two questions to reflect satisfaction: "gained an understanding of the plan" and "felt able to raise concerns easily."
RESULTS: We collected 26 days' data (208 patients). FCR occurred in 45 (22%) patients. We collected 182 staff surveys and 80 parent surveys. Increased FCR was associated with shorter rounding time per patient (rho=-0.22, p=0.002). Family satisfaction was high and, while unaffected by FCR (median 51 vs. 51.5, p=0.91), families who experienced FCR more often strongly agreed that they knew team members' roles (58% vs. 48%, p=0.027). With more FCR, trainees reported less autonomy (rho=-0.18, p=0.05). FCR were associated with a stronger perception that managing the length of rounds (rho=0.22, p=0.01) was easy, especially among attending physicians (rho=0.47, p=0.04). FCR was associated with increased nurse satisfaction (rho 0.32, p=0.056).
CONCLUSIONS: FCR improved efficiency, family understanding of team members' roles, and nurse satisfaction. Trainees' perception of decreased autonomy requires attention. Continued faculty and staff development will be critical to furthering engagement in FCR.

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Fellow in Training

10:45 AM

Impact of an Evidence-Based Medicine Curriculum on Residents' Medical Literature Use

Kathryn Scharbach, Philip O. Ozuah.
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BACKGROUND: Evidence-Based Medicine (EBM) refers to the conscientious and explicit use of the current best evidence in making decisions about the care of individual patients. The majority of studies about teaching EBM focus on knowledge of EBM and developing critical appraisal skills. We sought to investigate the impact of teaching EBM on resident use of the EBM skills of searching for and applying the best information.
OBJECTIVE: To evaluate the effect of an EBM curriculum on resident use of MEDLINE and medical literature for the purposes of learning and patient care decisions.
DESIGN/METHODS: We conducted a repeated measures survey of pediatric residents at an urban tertiary care academic children's hospital. 84 residents completed anonymous questionnaires over two academic years to assess their use of MEDLINE and medical literature over the preceding week. Four cycles of questionnaires were completed in the first academic year and one cycle in the second year. Descriptive statistics were performed, repeated-measures ANOVA was used to determine whether use of MEDLINE or medical literature increased over time, and Mann Whitney U tests were used to assess whether increased total exposure to EBM sessions was associated with increased use of MEDLINE or medical literature.

RESULTS: A total of 268 questionnaires were completed and analyzed, of which 34%, 33% and 33% were from PGY-1, PGY-2 and PGY-3s, respectively. Compared to residents who had attended two or fewer EBM sessions, residents who attended three or more sessions were significantly more likely to use medical literature for general learning (median 2 vs. 3; IQR 1-3 vs. 2-5), ($p<.035$). In contrast, a statistically significant difference was not detected based on exposure to EBM sessions for the use of medical literature for patient care questions (median 1; IQR 0-2 for both; $p=.30$) or the use MEDLINE (median 0; IQR 0-2 vs. 0-3; $p=.66$).
CONCLUSIONS: In our study, residents who participated in three or more EBM sessions were significantly more likely to use medical literature for general learning than those who had participated in fewer sessions. These findings have implications for the notion that residents will use medical literature more with greater exposure to EBM.

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11:00 AM

A Novel Approach to Residents' Scholarly Activities (RRC Requirement IV B)

Fernanda E. Kupferman, Rusly Harsono, David DiJohn, Lily Lew, Louis Primavera, Susana Rapaport.

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BACKGROUND: The Accreditation Council for Graduate Medical Education (ACGME) requires residents to participate in scholarly activities such as research that will contribute to their comprehensive lifelong learning experience.
OBJECTIVE: To evaluate whether our Novel Research Curriculum (NRC) improves residents' scholarly activities, helping them to fulfill their research project requirement.
DESIGN/METHODS: In 2007, a research team leader was appointed to develop a NRC, to teach and to supervise all research activities. The NRC includes early involvement of residents in post graduate year (PGY) 1 level into research activities: literature review, research question, mentor selection, objective, hypothesis, study design, data management, basic statistics, ethics, IRB submission, and creation of scientific posters and oral presentations. Each resident's progress is reviewed weekly and individual mentoring is provided. Residents are entitled to a 3-week research elective. The final project presentation was advanced to December prior to graduation year. All new abstracts are submitted to local, regional and national scientific meetings. We compared the number of resident's research projects accepted at local, regional and national scientific meetings before (PGY 3 in or prior to year 2006, group 1, G1), at initiation (PGY 3 in year 2007, group 2, G2) and after full implementation (PGY 3 in year 2008, group 3, G3) of our NRC. Satisfaction surveys were collected from graduated residents. Data was reported in percentage, mean ± SD and analyzed using ANOVA.
RESULTS: G3 showed the highest number of presentations at regional and national meetings. ANOVA was significant for regional ($p=.007$), national ($p=.037$), and total number of presentations ($p=.037$). No difference among the 3 groups was found for local presentations ($p=.626$). Of 35 ex-residents, 24 (69%) completed the satisfaction survey (G1 = 59%; G2 = 78%, G3 = 89%). Most G3 residents responded that the NRC provided a positive educational experience (96%) and would recommend it to others (92%).
CONCLUSIONS: The implementation of NRC helps residents to improve their research skills, and to successfully meet the scholarly activity required as part of RRC, requirement IV B.

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Fellow in Training

11:15 AM

Pediatric Resident Knowledge of Sport-Related Concussion

Katherine E. Nicholson, Lei Chen.

Pediatric Emergency Medicine, Yale University School of Medicine, New Haven, CT.

BACKGROUND: Concussions are common injuries sustained by young athletes. General pediatricians will increasingly find themselves responsible for providing follow-up care for sports-related concussion (SRC). The consequences of returning to play before fully recovering from a concussion or sustaining multiple concussions can be serious, ranging from second impact syndrome to chronic neurocognitive problems. It is imperative that graduates of pediatric residency programs be able to evaluate young athletes and provide guidance to return them to play safely.
OBJECTIVE: To examine pediatric residents' knowledge of return to play (RTP) recommendations after SRC.
DESIGN/METHODS: We designed a survey consisting of 12 questions addressing demographics, previous instruction in the management of sport related concussion, general knowledge of concussion and clinical scenarios. A likert scale was used to address resident comfort with SRC management. Multiple-choice questions were used to assess knowledge. The definitions and recommendations outlined in the Summary and Agreement Statement of the 2nd International Symposium on Concussion in Sport as developed by the Concussion in Sport Group (CISG) were used as the reference standard for the purposes of this study. The survey was distributed to pediatric residents in the New England Region of the United States using an Internet survey tool.
RESULTS: Eighty residents from 11 residency programs responded. Participants were from all levels of training, with PGY1-3 equally represented. Fewer than 50% reported receiving formal training in management of SRC. This was consistent across all levels of training. When asked about performing immediate sideline evaluations, 60% were comfortable. However, when confronted with a clinical scenario, only 39% answered correctly. One-third would return a child who had been dazed and disoriented to play in the same game. Seventy-five percent or participants reported feeling comfortable managing post-concussive symptoms. When making return to play decisions, 70% felt comfortable. Yet, only 36-62% were able to answer clinical scenarios correctly.
CONCLUSIONS: Pediatric residents receive inconsistent formal training in the management of SRC. They report feeling somewhat to very comfortable in the management of SRC. However, they performed poorly on clinical scenarios.

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House Officer

11:30 AM

New Interns Have Little Training or Confidence in Their Pediatric IV Skills

Payal Kadia, David Kessler, Eric Weinberg, Chris Strother, Julie Lindower, Joshua Rocker, Laura Haubner, Matei Patrescu, Lindsey Tilt, Gunjan Kamdar, Grace Artaega, Marc Auerbach.

Yale University School of Medicine, New Haven, CT; NYU School of Medicine, NY; Weil Cornell Medical College, NY; Mount Sinai School of Medicine, NY; University of Iowa, DM; Schneider Children's Hospital, NY; University of South Florida, FL; Tulane University School of Medicine, LA; Children's Hospital of New York Presbyterian, NY; Mayo Clinic Children's Hospital, MN.

BACKGROUND: Interns are expected to place IVs with a sufficient competency level at the beginning of training.
OBJECTIVE: To describe interns' medical school experiences (didactic, simulation, observation, performance) with IV placement; to explore how experiences impact knowledge and confidence at the start internship.
DESIGN/METHODS: Anonymous online surveys were completed by interns at 10 pediatric centers. The survey included 10 questions about experience, a 6-item knowledge quiz and an assessment of confidence (4 point likert scale). This data is from a multi-center network designed to collect patient outcomes in simulation education [POISE].
RESULTS: Of 189 interns who completed the survey 56% received IV didactic teaching and 52% participated in simulator training during medical school. New interns had observed many adult and child IV placements. However, few interns (20%) had observed infant IV. The majority of interns had performed at least 5 adult IVs during medical school. Fifty percent had performed a child IV and only 18% had placed an infant IV. Of those who performed child IV, their first attempt success rate was 42%. There was no difference in success rates of IV placement for providers who had didactic teaching or simulation experiences during medical school. Knowledge: Infant IV knowledge on a 6-item quiz was excellent (mean score = 80%). Confidence: Fifty percent of interns who had performed IV during medical school felt confident in the procedure, compared to only 12% of interns reporting confidence in the group who had never performed an IV ($p< 0.001$). Thirty-four percent of those who observed IV placement during medical school felt confident in placement whereas only 7% of those who never observed IV placement felt confident ($p<0.008$). There was no difference in confidence level when comparing didactic or simulation experience.
CONCLUSIONS: Pediatric interns have a mediocre level of IV training or experience during medical school. Knowledge with infant IV is excellent, but confidence level is low. There is no difference in success rates or confidence levels based on didactic or simulator experience. However, clinical performance is associated with an increased confidence level in IV placement. The impact of simulator experience on clinical outcomes should be studied prospectively.

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Fellow in Training

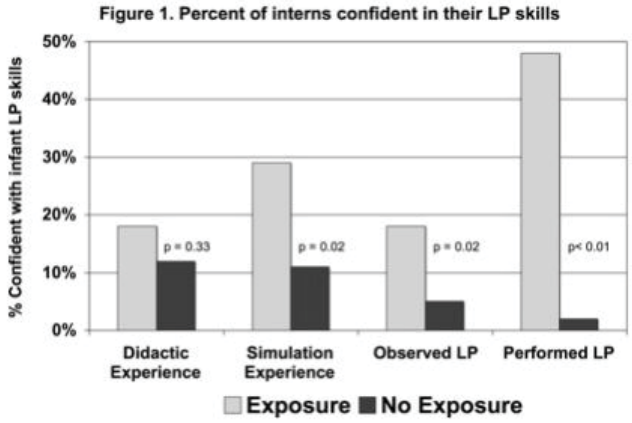
11:45 AM

A Multi-Center Study of Infant Lumbar Puncture during Medical School

David Kessler, Eric Weinberg, Chris Strother, Julie Lindower, Joshua Rocker, Laura Haubner, Grace Arteaga, Matei Petrescu, Lindsey Tilt, Gunjan Kamdar, Michael Miller, Jessica Foltin, Marc Auerbach.

Yale University School of Medicine, New Haven, CT; NYU School of Medicine, NY; Weil Cornell Medical College, NY; Mount Sinai School of Medicine, NY; University of Iowa Children's Hospital, DM; Schneider Children's Hospital, NY; University of South Florida College of Medicine, FL; Mayo Clinic Children's Hospital, MN; Tulane University School of Medicine, LA; Children's Hospital of New York Presbyterian, NY.

BACKGROUND: Interns are expected to perform high-stakes procedures such as infant lumbar punctures (LP) with little training or exposure during medical school.
OBJECTIVE: To describe interns' medical school experiences with infant LP; to explore how experiences impact knowledge and confidence at the start internship.
DESIGN/METHODS: Anonymous online surveys were completed by interns at 10 pediatric centers. The survey included 10 questions about experience, a 5-item knowledge quiz and an assessment of confidence (likert scale). Data was collected from interns enrolled in a multi-center randomized trial evaluating the impact of LP simulation training on patient outcomes (POISE).
RESULTS: 189 interns completed the survey. Training/Exposure: Few interns received LP didactics (23%) or simulator training (16%) during medical school. Seventy percent of interns had observed and 26% had attempted an infant LP during medical school, with 55% reporting success on their last attempt. Interns with simulator experience or who observed an LP were more likely to have attempted an LP on a real patient but neither was associated with improved clinical success. Knowledge: Infant LP knowledge was poor (mean 57%). Knowledge scores were significantly greater for those who observed or performed LPs but were unaltered by didactic or simulator experience. Confidence: The majority of interns (87%) did not feel confident in their ability to perform an infant LP. Simulator training improved confidence as did observation and performing an LP. (See Figure 1)



CONCLUSIONS: Pediatric interns have minimal LP training or experience during medical school. Knowledge and confidence with infant LP is low at the start of internship. Both clinical exposure and simulator experience are associated with procedural confidence. The impact of simulator experience on clinical outcomes should be studied prospectively.

Emergency Medicine Platform Session

Sunday, March 28, 2010
9:45 AM-12:00 PM

230 — Fellow in Training

9:45 AM

Ultrasound Evaluation of Skull Fractures in Children

Antonio Riera, Lei Chen.
Pediatric Emergency Medicine, Yale-New Haven Children's Hospital, New Haven, CT.

BACKGROUND: Closed head injury (CHI) is a common condition in the pediatric emergency department (PED). Skull fractures are the most common radiographic findings after CHI. Skull fractures are associated with intracranial injury. Exposures to radiation have the potential to cause malignancies. Decision rules for obtaining computed tomography (CT) scans after CHI yield high sensitivity but lack specificity for intracranial injuries. A disproportionate number of CTs are normal in the evaluation of pediatric CHI. Bedside ultrasound can be used to detect long bone fractures. No research to date describes the potential application of ultrasound in the diagnosis of skull fractures.
OBJECTIVE: To investigate the test characteristics of bedside ultrasound for the detection of skull fractures in children with CHI.
DESIGN/METHODS: This is a prospective observational study involving a convenience sample of patients seen in a tertiary care children's hospital. Children less than 18 years of age were enrolled if they were evaluated for an acute CHI and a CT scan was performed. Subjects with open skull fractures, suspected non-accidental trauma or requiring urgent intervention were excluded. Ultrasounds were performed by PED attendings or fellows with at least 1 month of training in bedside ultrasound. A high frequency linear probe was placed over the scalp hematoma or point of impact. Images were recorded in two orthogonal planes and saved for quality assurance. A real time interpretation as positive or negative for the presence of a skull fracture was recorded. Final results of the head CT, as interpreted by attending radiologists, were used as the comparison standard.
RESULTS: To date, 40 patients have been enrolled. The median age is 2 years (range 2 mo - 17 yr). Eleven patients (28%) were diagnosed with skull fractures on CT scan. The sensitivity of bedside ultrasound was 82%, specificity was 97%, negative predictive value 93 % and positive predictive value 90%.
CONCLUSIONS: Our pilot data suggest that ultrasound can be used to detect skull fractures in children after closed head injury. Bedside ultrasound could serve as a useful adjunct to clinical decision rules.

231 — House Officer

10:00 AM

To CT or Not CT: Neurologic Complaints in Young Children Presenting to the Emergency Department

Rebecca S. Kriss, Karen R. Carpenter, Karin B. Nelson, Tarannum M. Lateef.
Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA; Neurology, Children's National Medical Center and George Washington University, Washington, DC; National Institute of Neurologic Disorders and Stroke, National Institutes of Health, Bethesda, MD.

BACKGROUND: Head Computed Tomographic (CT) scans are used to evaluate children presenting to the Emergency Department (ED) with neurologic complaints. CT scans pose risk of radiation-induced malignancy, especially in young children.
OBJECTIVE: To describe clinical indications prompting emergent head CT and examine the circumstances in which scans contributed to immediate management in children.
DESIGN/METHODS: Electronic records of children aged 1 month to 6 years receiving a head CT at a large suburban ED from February 26 through September 30, 2008 were reviewed. Age, sex, chief complaint, history, physical examination, indication for and results of head CT, number of head CT scans performed to date, final disposition, and red flags in history or physical examination were recorded. Abnormal scans were classified as incidental or significant and subsequent interventions were documented.
RESULTS: There were 8,446 children between the ages 1 month and 6 years seen in the ED and 236 (2.8%) had a head CT. Indications for head CT included: trauma 58%, seizure 10% (of which 21% had a previous diagnosis of epilepsy, 50% an afebrile seizure, and 29% a febrile seizure), and headache 8%. Less common indications included altered mental status, pre-existing neurological diagnoses (e.g. VP shunt), suspected non-accidental trauma, and ataxia. Abnormalities on CT were found in 38% (89 children): 56 incidental findings, 10 pre-existing abnormalities, and 23 significant findings. Only 3 of the 23 required immediate intervention and all 3 had red flags in both history and physical exam. Only 2 of the 23 lacked a red flag, both of whom were admitted for observation and discharged within 24 hours with outpatient follow-up. A total of 40% lacked a red flag.

Red Flags vs Head CT Results

	Normal CT	Incidental Finding	Significant Finding	Pre-Existing Abnormality	Total
No Red Flag	68	23	2	1	94
Red Flag in History	40	6	4	6	56
Red Flag in Physical Exam	16	10	3	0	29
Red Flag in History and Physical Exam	23	17	14	3	57
Total	147	56	23	10	236

Of note, 20% received more than one head CT scan to date, and 8% had between 3 and 12 scans.
CONCLUSIONS: A significant number of children receiving head CT scans in the ED did not appear to have clinical justification for the procedure. Abnormalities on head CT scans in this sample were almost always predicted by history and physical examination, and every child requiring emergent intervention had red flags.

232 — Fellow in Training

10:15 AM

The Association of Weight Percentile and Motor Vehicle Crash Injury among 3 to 8 Year Old Children

Mark R. Zonfrillo, Kyle A. Nelson, Michael J. Kallan, Dennis R. Durbin.
Division of Emergency Medicine, Children's Hospital of Philadelphia, Philadelphia, PA; Center for Injury Research and Prevention, Children's Hospital of Philadelphia, Philadelphia, PA; Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: In the United States (US), motor vehicle crashes (MVCs) injure nearly 60,000 children ages 3-8 years annually. The use of age-appropriate child restraint systems significantly reduces injury and death associated with MVCs. Pediatric obesity has become a global epidemic. Although recent reported analyses from national crash databases suggests an association between pediatric obesity and MVC-related injury, there are potential misclassifications of body mass index from under-estimated height in younger children. Given this limitation, age- and sex-specific weight percentiles can be used as a proxy of weight status.
OBJECTIVE: The specific aim of this study was to determine the association between weight percentile and the risk of significant injury for children 3-8 years in MVCs.
DESIGN/METHODS: This is a cross-sectional study of children aged 3-8 years in MVCs in 16 states in the US, with data collected via insurance claims records and a telephone survey from 12/1/98-11/30/07. Parent-reported injuries with an abbreviated Injury Scale (AIS) score of 2+ indicated a clinically significant injury. Age- and sex-specific weight percentiles were calculated using pediatric norms.
RESULTS: The study sample included 9,402 children aged 3-8 years (sample weighted to represent 158,928 children), of which 0.97% sustained clinically significant injuries. There was no association between age and sex-specific weight percentiles and clinically significant injury when adjusting for restraint type (p=0.73). There was a higher risk of clinically significant injury for those children in seats belts (OR=2.99, 95% CI: 2.11-4.23) or unrestrained (OR=7.90, 95% CI: 4.83-12.90) as compared to children in child restraint systems, regardless of weight percentile.
CONCLUSIONS: The risk of clinically significant injury did not vary with weight percentiles in this sample of children in MVCs. Children in proper restraint devices had a lower relative risk of significant injury regardless of weight status. Parents should continue to properly restrain their children in accordance with published guidelines. Specifically, children of this age should be in a belt-positioning booster seat until they are at least 57 inches (145 centimeters) tall.

233 — Undergraduate Student

10:30 AM

Impact of the CARES Psychiatric Assessment Unit on Patient Management in the Emergency Department

Lauren C. Griffin, Peter D. Masso, Lynn Mangini, Michael Stevens, Sharon R. Smith.
Molecular and Cell Biology, University of Connecticut, Storrs, CT; Psychiatry, Connecticut Children's Medical Center, Hartford, CT; Pediatric, Connecticut Children's Medical Center, Hartford, CT.

BACKGROUND: Pediatric psychiatric emergencies are a nationwide crisis, and have contributed to an increase in behavioral health Emergency Department (ED) visits. A collaborative response to this crisis by Connecticut Children's Medical Center (CCMC) and Hartford Hospital/Institute of Living was the creation of the Child & Adolescent Rapid Emergency Stabilization Program (CARES).
OBJECTIVE: To determine how the introduction of the CARES unit has influenced length of stay for behavioral health patients in the ED.

DESIGN/METHODS: A retrospective chart review of ED patients was conducted. Children presenting one year prior to CARES: 10/13/06-10/13/07 (Group 1) were compared to children presenting one year after: 10/15/07-10/15/08 (Group 2). The study population includes all patients who presented to the CCMC ED with psychiatric illnesses. Patients were excluded if they also had significant medical problems that required admission to the medical facility. Patients who eloped from the ED or left against medical advice were also excluded. The primary outcome is mean length of stay in hours. Supplemental analyses of: month of service, the removal of repeat patients (only first visits or unique visits each year), insurance status, discharge disposition and psychiatric diagnosis were performed to determine if CARES impacted any of these groups more significantly than others.
RESULTS: There were 1719 visits before and 1867 visits after CARES, with 1190 and 1273 unique visits, respectively. Table 1 shows the demographic breakdown of the population, and is consistent with the Greater Hartford population.

	Before CARES (Group 1)	After CARES (Group 2)
	N=1719	N=1867
Age (SD)	12.9 (3.1)	13.2 (2.9)
Gender (female)	48.2%	48.1%
Caucasian	42.9%	43.2%
African-American	36.1%	34.3%
Hispanic	18.7%	20.5%
Length of Stay Hours (SD)	19.7 (32.6)	10.8 (19.9)

The children in both groups had similar age, gender, and ethnicity. Group 1 had a mean length of stay of 19.7 hours (SD 32.6) while Group 2 had 10.8 hours (SD 19.9), $p<0.0001$. Evaluating only unique visits in each group, the difference remained highly significant. The LOS difference between groups was significant in all months, with the greatest differences in November, December, and January.
CONCLUSIONS: The development of the CARES unit has significantly decreased the length of stay for behavioral health patients in the pediatric ED.

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10:45 AM

2009 Swine Flu Epidemic and Pediatric Emergency Services; What Have We Learned?

David Listman, Jeffrey Chen, Rosemary Didonato, Elliot Schottland, David Perlstein, David H. Rubin.

Pediatrics, St. Barnabas Hosptal, Bronx, NY; Pediatrics, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: In late April 2009, reports of a novel strain of influenza virus (A/H1N1) began to circulate in New York City as well as in many communities worldwide. WHO defined the emerging pandemic as "a public health emergency of international concern." Despite the NYC Department of Health recommending city residents to practice hygiene related protective measures and avoid clinics and hospitals (if not a member of a high risk group), residents of all ages appeared in large numbers in emergency departments and clinics throughout the city. This surge in emergency related visits stressed an already overburdened health care system.
OBJECTIVE: To study factors associated with the large increase in pediatric emergency department patient visits and the disposition of these patients during the swine flu epidemic of 2009 in a New York City hospital.
DESIGN/METHODS: We reviewed the medical charts of every patient (0-18yrs) seen in the Pediatric Emergency Department (PED) of St Barnabas Hospital, a mid-size community hospital (annual volume of 25,000 children), between April 29, 2009 and June 15, 2009. Patients that met CDC criteria for influenza like illness (ILI patients) at PED triage were selected for review and formed the basis of this study; charts were reviewed and data abstracted.
RESULTS: 4,921 children 0-18 years of age were seen in the PED during the study period - an increase of 77% over the same time period in 2008. 2,543 (51.7%) fulfilled CDC ILI criteria. The most frequent discharge diagnoses were: ILI: 82%, asthma/bronchospasm 10.7%, and gastrointestinal disease 3.8%. ILI children were characterized as: age: 6.9±4.8 yrs, and 53% male. A total of 372 of the 4,921 children seen in the ED during the study period were admitted to the hospital (7.6%); 71/372 (19.1%) had ILI. Of all children with ILI seen in the PED, 71/2,543(2.8%) were admitted. Significant predictors of admission among the children with ILI were younger age (adjusted OR 0.95 95%CI .90, .99), and symptoms related to asthma/bronchospasm (adjusted OR 7.72, 95%CI 4.4, 13.7).
CONCLUSIONS: These data suggest that the ILI disease seen in Spring 2009 was relatively mild with a low percentage of children admitted to the hospital. Younger children had higher rates of admission compared with older children. The majority of admissions were due to bronchospasm. The large surge in PED volume severely strained resouces at a mid sized community hospital.

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Fellow in Training

11:00 AM

Patient Satisfaction in a Pediatric Emergency Department (ED): What Really Matters?

Anita Roy, Jobayer Hossain, Alex Koster, Mariane Stefano, Kay Holbrook, Magdy Attia, Jay Greenspan.

Emergency Medicine, Nemours/Alfred I. Dupont Hospital for Children, Wilmington, DE; Pediatrics, Thomas Jefferson University, Philadelphia, PA; Biomedical Research, University of Delaware, Wilmington, DE; Nemours Foundation, Jacksonville, FL.

BACKGROUND: Patient satisfaction has become paramount as it is considered a surrogate marker for quality of care from the patient's perspective. Traditional quality indicators such as length of stay (LOS), arrival time to first MD, and outcome data may not reflect what patients view as important. Our ED adopted a patient satisfaction initiative (PSI) using Studer Group's methods including hourly nursing rounds, senior leadership rounds, discharge phone calls, and scripted communication. Patient satisfaction scores (PSS) using Press Ganey surveys were available for comparison before and after the PSI.
OBJECTIVE: To evaluate the efficacy of the PSI. Secondarily, to assess whether improved PSS correlate with traditionally measured quality indicators.
DESIGN/METHODS: We performed an analysis of PSS returned from guardians who visited our ED from 1/06-3/09. All 42 questions in the PSS were included. Responses used a 5-point Likert scale 1-5 (highest). Besides descriptive statistics, Pearson Chi-square test and two sample t-test were used to examine the distribution of other influential variables by group (before and after PSI initiation). Multiple ordinal logistic regressions were used to determine the effect of the PSI after the adjustment of influential covariates (such as patient race, gender, age, acuity, insurance etc).
RESULTS: 2601 surveys were analyzed. 1087 (42%) were before the PSI. There was no significant difference in regard to gender, age, or insurance when comparing the two groups.

Table-1: Adjusted Ordinal Logistic Regression (Comparison of Satisfaction Before and After PSI)

Response Variables	p-value	Odds Ratio	95% CI of OR
Likelihood to Recommend	0.004	1.297	1.088-1.548
Overall Care	0.000	1.409	1.191-1.665
Pain Control	0.019	1.218	1.032-1.436
Nurse Courtesy	0.032	1.206	1.016-1.429
Doctors' Care	0.316	1.118	0.899-1.39
Informed about Delays	0.023	1.19	1.024-1.394

Models are adjusted for patient race, acuity, financial info, location, LOS, and arrival time of first MD.

outlines key variables.
CONCLUSIONS: Implementing a PSI using a few simple steps was an effective tool to increase PSS, despite no change in LOS, arrival time of first MD, or rating of doctor care. This indicates that families' perception of care does not necessarily correlate with the traditionally measured indicators.

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11:15 AM

Detection of Hypoventilation by Capnography and Its Assosciation with Hypoxia in Children Undergoing Sedation with Ketamine

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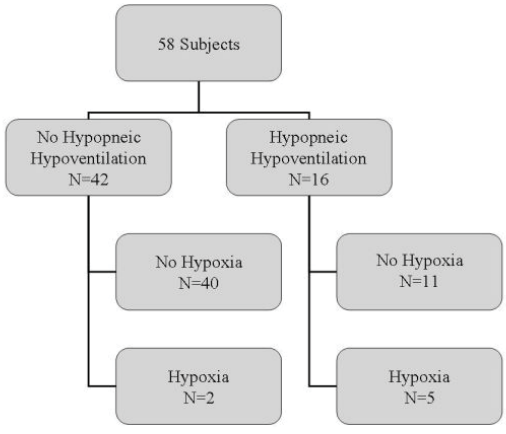
BACKGROUND: Procedural sedation is commonly performed in the Emergency Department (ED) and is not without risks such as hypoventilation or hypoxia. Ketamine is a drug of choice in this setting, however the frequency of hypopneic hypoventilation with this agent have not been established. Hypopneic hypoventilation, a decrease in tidal volume without a change in respiratory rate, is not easily detected by standard monitoring practices during sedation, but can be detected by capnography.
OBJECTIVE: To determine the frequency of hypopneic hypoventilation, defined as an end-tidal carbon dioxide ($ETCO_2$) <30mmHg without a concomitant rise in respiratory rate and its association with hypoxia, defined as pulse oximetry <95%, in patients undergoing sedation with ketamine. To determine the temporal relationship between capnography and changes in pulse oximetry during these events.
DESIGN/METHODS: In this observational study, children who received intravenous ketamine in the ED for sedation were prospectively enrolled. Heart rate, respiratory rate, pulse oximetry and $ETCO_2$ were recorded every 30 seconds. Providers were blinded to the $ETCO_2$ monitor.
RESULTS: Fifty-eight subjects were included in this study. 50% had $ETCO_2$ values <30mmHg without a rise in respiratory rate. 28% had a decrease in pulse oximetry <95%. Patients who experienced a persistent decrease in $ETCO_2$ (>30 seconds in length)were much more likely to have a persistent decrease in pulse oximetry (>30 seconds) than those with normal or transient decreases in ETCO, (RR 6.6, 95% CI 1.4-30.5).



72% of episodes of hypoxia were preceded by low $ETCO_2$ levels. Decreases in $ETCO_2$ occurred on average 3.7 minutes prior to decreases in pulse oximetry.
CONCLUSIONS: Hypopneic hypoventilation, as detected by capnography, is common in children undergoing sedation with ketamine. Further studies are needed to determine if the addition of capnography to routine monitoring can reduce the frequency of hypoxia in children undergoing sedation.

Sunday, March 28, 2010
9:45 AM-12:00 PM

237
11:30 AM

Impact of an Economic Disaster on Access to Child Healthcare and Utilization of the Pediatric Emergency Department

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BACKGROUND: The recent global economic crisis has threatened the financial security of many families in the United States. Job loss often means loss of child healthcare benefits, interruption in preventative care, and anxiety about payment when illness or injury occurs.
OBJECTIVE: We hypothesized that job loss and low annual household income (AHI) are associated with insurance loss and decreased access to child healthcare, and sought to measure the strength of these associations.
DESIGN/METHODS: We conducted a prospective, cross-sectional study at our urban, university-based pediatric emergency department (ED). Subjects were caretakers of children presenting to the ED from June 1 to July 27, 2009. A survey was designed to assess patients' demographics, AHI, insurance status, and attitudes and anxiety about paying for healthcare in the last six months. Staff recorded patient triage level. Household income was analyzed in categories based on the 2007 US Census Bureau Survey. Data analysis was performed via SAS software, with the t-test used for continuous variables, chi square test for categorical variables, and logistical regression to measure associations between variables.
RESULTS: 467 subjects were enrolled. Among subjects, 29.5% had an AHI <$17,000, vs. 18.5% reported in the 2007 census data. Insurance discontinuation had occurred for 9.4% of children, vs. 5.4% for the US census data. Families with AHI < twice the FPL were more likely to have child insurance discontinuation in the last 6 months (OR=3.92, 95% CI 1.06, 14.54). Parent job loss was reported by 22.1% of respondents. Job loss for a parent was associated with loss of the child's health insurance (OR=3.2, 95% CI 1.65, 6.20), avoiding the primary care pediatrician's (PCP) office due to the cost of an office visit (OR=2.43, 95% CI 1.25,4.71), and anxiety about paying for the ED visit (OR=1.86, 95% CI 1.23, 2.80). There was an association between less acute triage level with both parent job loss (p<0.036) and AHI < twice FPL (P<0.004).
CONCLUSIONS: Compared to the general population, parent job loss and child health insurance loss are more prevalent in families of children presenting to the emergency department. Job loss is associated with low-acuity ED presentation, and avoidance of the PCP. Recognition of job loss and low income in the ED can lead to enrolling eligible children in public health insurance programs.

238 Fellow in Training
11:45 AM

Decreasing Unplanned Return Visits in Children with Fever in the Emergency Department

Amy L. Dunn, Josh Palmbech, Sharon R. Smith.
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BACKGROUND: Overcrowding in the emergency department (ED) is one of the most pressing issues in the national health care debate today. One of the many causes of ED overcrowding is unplanned return visits. Young febrile children frequently make unplanned return visits to the emergency department (ED). Specific discharge instructions were developed to address parental fears and provide proper antipyretic dosing to decrease unneccessary return visits to the ED for fever.
OBJECTIVE: To evaluate the association between receiving specific fever instructions and the rate of return to the ED within the subsequent 48 hours.
DESIGN/METHODS: This study is a retrospective case-control study of a sample of children aged 8 weeks to 5 years who presented to the ED with fever over a one-year time period. Demographic characteristics were compared along with receipt of specific fever instructions and the completeness of the instructions. Inclusion criteria were fever over 100.4 degrees F and age 8 weeks to 5 years. Exclusion criteria included: admission to the hospital, chronic medical conditions, returned to the ED for an unrelated complaint and patients that left without being seen.
RESULTS: 202 medical charts were audited. 120 (59.4%) did not return to the ED and 82 (40.6%) did return within 48 hours of index ED visit. 74.2% of children who did not return to the ED received specific instructions compared with 53.7% of patients that did return (p=0.003). Demographic characteristics of children who did and did not return within 48 hours were similar including age, gender, insurance, race, average temperature, and receipt of antipyretics in the ED.

Demographics

	48 Hour Return	No 48 Hour Return
Mean Age Months (SD)	17.3 (15.2)	19.4 (13.6)
Gender (% Male)	59	56
Public Insurance (%)	79	75
Private Insurance (%)	17	18
Race, Caucasian (%)	33	23
Race, African American (%)	10	21
Race, Hispanic (%)	44	43
Average Temp °F (SD)	103.0 (1.6)	102.6 (1.5)
Antipyretics Given (%)	92.7	87.5

More patients in the 48-hour return group received instructions missing antipyretic dosing than children in the group that did not return (53.7% vs 40.8%).
CONCLUSIONS: Among children with fever seen in the ED, those who did not return within 48 hours were more likely to have received specifically designed instructions for fever. Specifically designed discharge instructions, may be helpful in decreasing unplanned return visits to the ED for common illnesses.

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9:45 AM

Detection of Pepsin in Mouth Swab, a Noninvasive Method of Detecting Gastroesophageal Reflux in Preterm Infants

Sabeena Farhath, Judy G. Saslow, Sam Sounder, Zhoping He, Barbara Amendolia, Sulaiman Sannoh, Vishwanath Bhat, Kee H. Pyon, Gary E. Stahl, Dev Mehta, Zubair H. Aghai.
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BACKGROUND: Gastroesophageal reflux (GER) is very common in premature infants. The currently available methods for the diagnosis of GER are invasive and unreliable in premature infants. Detection of pepsin in a mouth swab may correlate with GER in premature infants.
OBJECTIVE: To study the relationship between pepsin in a mouth swab and clinical GER in preterm infants.
DESIGN/METHODS: Preterm infants (Birth weight < 2000 gram) on full enteral feeds were enrolled in this study. Mouth swabs from the cheek and pharynx were collected 1, 2 and 3 hours after the feeds. An enzymatic assay with FITC-casein as substrate was used to detect pepsin activity. Pepstatin was used to selectively inhibit pepsin A. The final pepsin A activity was obtained by subtracting pepsin C activity from the total activity. The mouth swab analysis was considered positive if pepsin A or C was detected in any of the samples. GER was diagnosed clinically by a blinded investigator after reviewing the infant's medical record.
RESULTS: Seventy premature infants were enrolled {(mean±SD) birth weight 1185±366 grams, gestational age 29.0±3.0 weeks}. The median age of sample collection was 48 days (range 6-104 days). Pepsin was detected in at least one sample of 33/70 (47%) infants. A clinical diagnosis of GER was made in 32/70 (46%) infants (19 on medications for GER; 13 symptomatic, no medications). The mouth swab was positive in 23/32 (72%) infants with GER and only 10/38 (26%) infants without GER (P<0.001). The sensitivity and specificity of GER detection by measuring pepsin in a mouth swab were 72% and 74%, respectively.

	GER	No GER
Positive mouth swab	23	10
Negative mouth swab	9	28

CONCLUSIONS: The detection of pepsin in a mouth swab correlates with clinical GER in premature infants.

240 Fellow in Training
10:00 AM

Using Near Infrared Spectroscopy (NIRS) To Measure Bowel Motility in Preterm Infants

Mariam Said, Nickie Niforatos, Khodayar Rais-Bahrami.
Neonatology, Children's National Medical Center, Washington, DC; Neonatology, The George Washington University School of Medicine, Washington, DC.

BACKGROUND: Premature infants must adapt to extra-uterine life during a period in which many organ systems are not yet fully matured. Among these organ systems is the gastrointestinal (GI) system, whose immaturity predisposes the infant to several comorbidities including development of necrotizing enterocolitis (NEC) and gastric perforation. Research use of NIRS to monitor GI oxygenation is increasing. However, it was recently discovered that meconium in the GI tract is a chromophore and can interfere with the NIRS measurement.
OBJECTIVE: Determine if NIRS can be adapted to monitor the passage of meconium in the bowel and thereby provide an indicator of bowel motility in the preterm infant.
DESIGN/METHODS: After parental informed consent, we used a 4-wavelength NIRS device (FORE-SIGHT®, CASMED, Branford, CT USA) to monitor the infants. A NIRS sensor was placed on the right, lower, abdominal quadrant and NIRS data were collected every 2 seconds for a total of 72 hours/infant. Data from the FORE-SIGHT monitor were analyzed by a prototype meconium detection algorithm.
RESULTS: 10 preterm neonates with gestational age of 29-32 weeks and weighing 980-1650 grams were studied. The time that meconium was present under the NIRS sensor was computed. Percentage of meconium detected by NIRS to overall monitor time was determined for all subjects as shown in the Table. To test the sensitivity of NIRS to detect meconium, non-meconium or transitional subjects were included for controls. As can be seen in the Table, false positives were near zero. Interestingly, 2 of 3 subjects that showed a high percentage of time where NIRS detected meconium under the sensor developed NEC.

Table 1

Meconium Stool Subjects	Percent time meconium under NIRS sensor	Outcome
1	97.0%	NEC +12 days after study
2	1.2%	Discharged
3	53.4%	NEC +35 days after study
4	56.9%	Discharged
5	8.7%	Discharged

Transitional Stool Subjects		
6	0%	Discharged
7	0%	Discharged
8	0.2%	Discharged
9	0.7%	Discharged
10	0%	Stable

CONCLUSIONS: It is known that poor bowel motility is one risk factor for premature neonates to develop NEC. As demonstrated, the 4-wavelength NIRS monitor used has the potential to evaluate bowel motility by monitoring meconium movement under the NIRS sensor. More data are needed to properly assess the relationship between NIRS detected bowel motility and outcomes.

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Fellow in Training

10:15 AM

Effect of Antenatal Erythromycin in Establishing Feeding in Preterm Neonates

Venkata S. Majjiga, James Smith, Boriana Parvez.

Pediatrics, Division of New Born Medicine, Westchester Medical Center, New York Medical, Valhalla, NY; Obstetrics and Gynecology, Westchester Medical Center, New York Medical, Valhalla, NY.

BACKGROUND: ACOG recommends 2 days of IV followed by 5 days of oral erythromycin in pregnant women with PROM between 24 and 31 weeks. This approach extends latency and allows for steroids administration. Erythromycin for preterm labor without PROM is associated with functional impairment on long term follow up. Erythromycin has prokinetic activity through its agonist action on motilin receptors; however chronic exposure has shown to down regulate motilin receptors in rabbits.

OBJECTIVE: To assess if antenatal erythromycin has an adverse effect on establishing feeding in preterm neonates.

DESIGN/METHODS: All preterm neonates with birth weight (BW) ≦1500g, born at or transferred within 24 hours of birth to MFCH who received antenatal erythromycin are compared to age and weight matched controls without antenatal erythromycin. Data regarding GA, BW, days to establish full feeds, amount of residuals per day, NEC and duration of TPN is collected. Maternal data for cumulative dosage and route of erythromycin, mode of delivery, medication and other maternal co-morbidities is collected. Data analyzed using independent sample't' test and chi-square test ($P < 0.05$).

RESULTS: Interim analysis of 54 preterm neonates is presented, 23 in erythromycin group (E) and 31 in no erythromycin group(Non E). In E group 8 mothers received IV for 48 hours, followed by oral and15 received only oral erythromycin. E group and Non E group did not differ statistically in GA, BW, daily residuals and Apgar score's.

Neonatal characteristics

Parameters, Mean ± SD, Median or Percentage	Erythromycin group	Non Erythromycin group	P Value
Birth weight (g)	911 ± 213,850	910 ± 231,865	NS
Gestational age (wks)	27 ± 1,27	27 ± 2, 26	NS
Male %	56 %	42 %	NS
C section %	65 %	77 %	NS
Apgar < 7 at 5 min	7 %	19 %	NS

More babies in E group received antenatal steroids (100% vs 75%) and BPD rates were higher in Non E group (43% vs 13 %) ($P< 0.05$). Non E group tended to be sicker (% NTIS Score > 20): 32 vs 9 ($P = 0.05$) and had history higher antenatal magnesium use. Despite delay in initiation of feeds by 3 days Non E group reached full feeds 4 days earlier.The E group whose mothers recieved IV erythromycin had a delay of 8 days to full feeds when compared to Non E group. E group tended to have higher NEC (22% vs 9%).

CONCLUSIONS: Antenatal erythromycin leads to delay in establishment of full feeds and may have increased morbidity (NEC). Its benefit of extending latency should be weighed against the possible adverse effect.

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Fellow in Training

10:30 AM

Percentage of Endothelial Progenitor Cells (EPC) in Human Umbilical Cord Blood of Preterm and Term Newborns

Ranjan Monga, Nitin Chouthai, Steven Buck, Priyankar Sharma, Saiprasad Gopal.

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BACKGROUND: EPC are present in peripheral circulation and may play roles in pathogenesis of several diseases. EPC have been evaluated for their therapeutic and diagnostic potential.

OBJECTIVE: To estimate the percentage of EPC in human umbilical cord blood of preterm and term newborns and to asses the influence of intrauterine environment.

DESIGN/METHODS: Human umbilical cord blood (CB) was obtained from 14 preterm and 17 term deliveries. Mononuclear cells were isolated and then subjected to Flowcytometry with the following reagents: IgG 1-FITC, CD45-ECD, CD133-PE, CD34-PC5, VEGFR-2 (KDR)-PE. Clinical data was obtained using chart review.

RESULTS: Three types of cellular population with potential to generate EPC were studied. The number and percentage of CD45(dim) and CD34+ cells was significantly higher in the population with PIH.

Results: CD 45(d), CD 34+

	Preterm (n=14)	**Term (n=17)**	**P Value**
Number	562.5 (185.5)	727.0 (257.5)	0.60
Percentage	3.5 (0.77)	5.2 (1.5)	0.35
	PIH (n=5)	**No PIH (n=26)**	**P Value**
Number	1413.6 (814)	506 (109)	0.04
Percentage	9.6 (3.8)	3.4 (0.68)	0.01
	SGA (n=4)	**AGA (n=27)**	**P Value**
Number	767.3 (271.1)	636.0 (176)	0.64
Percentage	4.3 (1.8)	4.4 (1.0)	0.59
	Black (n=21)	**White (n=10)**	**P Value**
Number	706.0 (218.4)	541.0 (218.1)	0.79
Percentage	4.8 (1.1)	3.4 (1.4)	0.95

Higher proportion of CD45(d), CD133+ and CD34+ in SGA without statistical significance.

Results: CD 45(d), CD 133+ and CD 34+

	Preterm (n=14)	**Term (n=17)**	**P Value**
Number	1716.3 (634.2)	1070.0 (291.0)	0.33
Percentage	13.8 (3.2)	9.7 (2.2)	0.28
	PIH (n=5)	**No PIH (n=26)**	**P Value**
Number	1631.0 (916.4)	1310.2 (355.0)	0.72
Percentage	18.5 (5.7)	10.2 (1.9)	0.75
	SGA (n=4)	**AGA (n=27**	**P Value**
Number	3126.8 (1920.0)	1100.5 (232.1)	0.04
Percentage	18.7 (7.6)	10.5 (1.8)	0.15
	Black (n=21)	**White (n=10)**	**P Value**
Number	1345.0 (279.5)	1396.0 (859.2)	0.94
Percentage	13.2 (2.2)	8.3 (3.6)	0.24

CD 45(d), CD 34+, 133+, VEGFR-2+ cells were not significantly different across clinical parameters.

CONCLUSIONS: Intrauterine environment especially PIH may affect percentage and function of EPC populations in CB. Additional studies are warranted to further evaluate the significance of EPC at various gestation ages and clinical conditions.

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10:45 AM

Role of Apoptosis in the Progression of Hematopoietic Abnormalities in Noonan Syndrome

Kimihiko Oishi, Andres Hidalgo, In-Kyong Kim, Paul S. Frenette, Bruce D. Gelb.

Pediatrics, Mount Sinai School of Medicine, New York, NY; Nacional de Investigaciones Cardiovasculares, Madrid, Spain; Medicine, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Gain-of-function (GOF) mutations in *PTPN11*, encoding the protein tyrosine phosphatase SHP-2, cause Noonan syndrome (NS) and hematological abnormalities including myeloproliferative disorder (MPD) or juvenile myelomonocytic leukemia (JMML). Previously, we generated transgenic fruit flies expressing GOF alleles of varying strength in corkscrew (csw), the *Drosophila* orthologue, and the Neel group generated a $Ptpn11^{D61G/+}$ mouse with NS that develops MPD at 10 months of age.

OBJECTIVE: To characterize the effects of *PTPN11* mutations on altered hematopoiesis.

DESIGN/METHODS: Transgenic flies expressing mutant and wild type *csw* driven by a hemocyte-specific driver, *hemolectin-GAL4,* were analyzed. The numbers of total, TUNEL- and phospho-histone H3-positive hemocytes from third instar larvae were counted. Bone marrows (BM) from D61G mice were analyzed. Flow cytometry with annexin V combined with specific surface markers were used to assess apoptosis in committed progenitor cells (LKS^{neg}). T and Pearson tests were used to assess significance.

RESULTS: In the fly, expression of GOF csw induced a strength-dependent increase in hemocyte proliferation and apoptosis (E76K>A72S>N308D), resulting in circulating hemocyte numbers that were inversely related with allele strength. Inhibition of apoptosis by expressing *Drosophila* IAP1 significantly increased the total hemocyte numbers in E76K-expressing larvae. In young D61G mice (< 3 months) (n=4), LKS^{neg} cells showed significantly higher apoptosis rates compared to WT littermates (n=3) (D61G: 1.7%±0.3, WT: 0.7%±0.2). Apoptosis was significantly reduced in LKS^{neg} cells from older (>10 months) D61G mice with MPD (n=5), while progenitor apoptosis was unchanged in older D61G without MPD (n=13) (D61G with MPD: 0.4%±0.2, D61G without MPD: 1.6%±0.3, WT: 2.3%±0.5). Spleen weight as a marker of MPD progression and apoptosis in LKS^{neg} cells were tightly correlated.

CONCLUSIONS: In flies, GOF csw induced increased proliferation that was balanced by increased apoptosis, netting to modest increases in hemocyte numbers compared to flies expressing cancer-related GOF Ras. Parallel findings were noted in young NS mice. Of importance, a reduction in apoptosis correlated with MPD progression. These results suggest that a second hit targeting the apoptotic pathways may trigger hematological malignancies in NS.

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11:00 AM

Inflammatory Responses to Long-Chain Polyunsaturated Fatty Acids (PUFA) in Neonatal Neutrophils

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BACKGROUND: Essential long-chain ω-3 PUFAs, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), have been associated with improved growth and reduced incidence of cholestasis and inflammatory bowel disease in neonates, independent of their metabolism to eicosanoids. It has recently been found that EPA/DHA exert biologic effects by binding PPAR-γ, a nuclear transcription factor that mediates the physiologic resolution of inflammation. Conversely, EPA/DHA have also been reported to activate protein kinase C, which mediates increased neutrophil activity and the generation of reactive oxygen species. The cessation of inflammatory responses is impaired in neonatal neutrophils, contributing to tissue injury in conditions such as necrotizing enterocolitis.

OBJECTIVE: We hypothesize that EPA and DHA suppress inflammatory activity in neutrophils, and that these responses may be decreased in neonates due, in part, to developmental impairment in PPAR-γ signaling.

DESIGN/METHODS: Neutrophils from umbilical cord and adult blood were isolated by density centrifugation and treated with EPA (100 μM), DHA (100 μM) or medium control, in the presence or absence of inflammatory stimuli and/or the PPAR-γ agonist, troglitazone (TgT, 10 μM). H_2O_2 production was measured by Amplex Red fluorescence. Production of IL-1β and IL-8 was quantified by cytometric bead array analysis.

RESULTS: DHA inhibited production of IL-1β and IL-8 by both adult and neonatal neutrophils, and decreased H_2O_2 generation by adult cells. In contrast, neonatal cells produced more H_2O_2 in response to DHA. EPA also induced increased production of H_2O_2 by both adult and neonatal

neutrophils, and of IL-1β and IL-8 by neonatal cells. PUFA-induced generation of H_2O_2, IL-1β and IL-8 was reversed by TgT.
CONCLUSIONS: DHA induces anti-inflammatory activity in adult neutrophils, but these responses are attenuated or absent in neonatal cells. EPA induces inflammatory activity in both adult and neonatal neutrophils, and neonatal cells are more sensitive to these effects. These findings indicate that EPA/DHA exert diverse effects in neutrophils, suggesting that they act via multiple signaling pathways. Decreased anti-inflammatory responses in neonates may be related to reduced expression or activity of PPAR-γ. The possibility of unexpected inflammatory effects should be accounted for in considering potential therapeutic uses for PUFAs in neonates. Supported by NIH HD058019, ES004738 and ES005022

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Medical Student

11:15 AM

CD34$^+$ Stem Cell Selection and CD3$^+$ Addback for Matched Unrelated Donor (MUD) Peripheral Blood Stem Cell Transplantation (PBSCT) in Pediatric Recipients

Mark B. Geyer, Judith S. Jacobson, Lauren Harrison, Joseph Schwartz, Mitchell S. Cairo.

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BACKGROUND: Positive selection of CD34 stem cells depletes T cells responsible for severe acute graft versus host disease (aGVHD). CD34-selected haploidentical SCT in children with leukemia and non-malignant diseases is associated with sustained engraftment and low risk of aGVHD but limited by delayed immune reconstitution (IR). Myeloablative conditioning (MAC) followed by CD34-selected MUD PBSCT with a CD3 dose of $5x10^5$/kg carries high risk of chronic GVHD (cGVHD) (Bunin et al., BMT, 2006).
OBJECTIVE: To determine engraftment, overall survival (OS), IR and frequency of PTLD and GVHD in pediatric pts at risk of severe aGVHD following CD34-selected MUD PBSCT.
DESIGN/METHODS: An Isolex 300i (Nexell, Irvine, CA) was used for CD34 selection with a goal of ≥$5x10^6$ CD34/kg PBSCs. T-cells were added back to reach a total CD3 dose of 1.0-$2.6x10^5$/kg. Conditioning was MAC in 59% vs reduced intensity (RIC) in 41%. GVHD prophylaxis consisted only of tacrolimus.
RESULTS: 17 pts, median follow-up 347 days, median age 15 yrs (8-23); 59/41% M/F; HLA match 29% 10/10, 29% 9/10, 41% 8/10; 71% malignant (58/42% poor/avg risk); median CD34 dose $x10^6$/kg 5.1 (2.0-13) and CD3 dose $x10^5$/kg 1.5 (0.1-2.6). Cell selection resulted in median CD34 recovery of 58.5% and 4.33 CD3 log depletion. All pts engrafted neutrophils (median day 12, range 9-27). 85% of evaluable pts engrafted platelets (median day 32, range 21-44). No pts developed PTLD. One pt developed CMV infection. Probabilities of grade II-IV aGVHD and limited cGVHD were 18.6% (CI_{95} 1-58%) and 35.4% (6-68%) respectively. Day 100 mortality was 7% (1-41%). 1-yr OS was 84% (50-96%). Of 12 pts with acute leukemia, 3 died from progressive disease. CD3, CD4, CD8, CD19, CD56, IgG, IgM and IgA levels at day +180/365 were normal in 20/38%, 0/13%, 40/63%, 70/100%, 100/100%, 56/57%, 44/43% and 67/29% of pts, respectively. RIC vs MAC recipients had lower risk of viral infection (p=.03) and greater OS (p=.06).
CONCLUSIONS: Rapid engraftment, no PTLD, no extensive cGVHD, minimal grade II-IV aGVHD and high 1-yr OS were observed following CD34 selection and T-cell addback. Indirect T-cell depletion during CD34 selection may slow T-cell recovery post-transplant. T-cell addback may maintain graft versus leukemia effect and prevent PTLD and opportunistic infections. These results support further investigation of CD34-selected MUD PBSCT in pediatric recipients.

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Medical Student

11:30 AM

Immune Reconstitution (IR) and Acute GVHD (aGVHD) Following Myeloablative (MAC) or Reduced Toxicity Conditioning (RTC) Prior to Unrelated Cord Blood Transplantation (UCBT) in Pediatric Recipients

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BACKGROUND: IR appears to be delayed following MAC and UCBT in pediatric recipients, compared to matched-sibling allogeneic stem cell transplantation (AlloSCT). RTC vs. MAC prior to AlloSCT is associated with decreased transplant-related morbidity and mortality; the effect of RTC on long-term IR in pediatric UCBT recipients remains unknown.
OBJECTIVE: To determine time to and predictors of IR and risk factors for aGVHD and chronic GVHD in pediatric UCBT recipients following MAC vs RTC.
DESIGN/METHODS: In 88 consecutive pediatric UCBT recipients, lymphocyte subset counts and Ig levels were quantified using FACS and ELISA at days +100, 180 and 365 and characterized as normal or low by age-specific norms.
RESULTS: 88 pts, median age 6.5 yrs (range 0.5-22), 59/41% M/F, 56/44% MAC/RTC, HLA match 19% 6/6, 28% 5/6, 52% 4/6; 66% malignant, median TNC $x10^7$/kg 3.8 (0.9-22.6) and CD34 $x10^5$/kg 2.1 (0.3-9.6). Lymphocyte subsets, Ig levels and percentages of children achieving normal counts did not differ significantly between MAC vs RTC groups; T cell recovery was similarly delayed.

	Day 100		Day 180		Day 365	
Subset	Mean±SD (cells/μL, mg/dL)	% Normal	Mean±SD	% Normal	Mean±SD	% Normal
CD3	238±241	0	396±365	0	1631±1207	54
CD4	121±143	0	234±239	14	879±600	71
CD8	97±146	3	136±131	5	688±644	58
CD19	595±569	53	885±754	67	1086±597	92
CD56	252±168	78	224±157	71	290±166	83
IgG	647±234	54	648±310	45	674±240	61
IgM	31±23	40	57±45	70	89±60	89
IgA	94±237	63	61±56	70	82±65	78

In a multivariable Cox model that included conditioning regimen, risk status, HLA matching, CMV status, time of transplant and TNC dose to analyze predictors of aGVHD, MAC vs RTC recipients had a significantly higher risk of grade II-IV aGVHD (HR 6.1, CI_{95} 2.0-19, p=.002) as did recipients of 4/6 HLA-matched CBT (HR 3.1, CI_{95} 1.1-8.6, p=.03). In a similar Cox model, pts receiving a 4/6 HLA-matched graft had a significantly higher risk of chronic GVHD (HR 18.5, CI_{95} 1.3-275, p=.04).
CONCLUSIONS: RTC vs MAC is associated with significantly lower risk of grade II-IV aGVHD. Regardless of conditioning intensity, T cell IR is delayed following UCBT in pediatric pts, while NK and B cell IR is relatively robust. Therapies designed to enhance early T cell IR post-UCBT warrant further investigation.

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11:45 AM

Duration of Mechanical Ventilation in Critically Ill Children with Symptomatic Central Venous Line-Related Deep Venous Thrombosis

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BACKGROUND: We hypothesize that critically ill children with central venous lines (CVL), who are at highest risk for deep venous thrombosis (DVT), develop pulmonary embolism (PE) leading to prolonged duration of mechanical ventilation (MV), longer stay in the intensive care unit (ICU), and even death.
OBJECTIVE: To correlate duration of MV, length of ICU stay and mortality with incident symptomatic CVL-related DVT in critically ill children.
DESIGN/METHODS: We performed a nested case cohort design involving children previously enrolled in a multicenter study on symptomatic DVT. Patients less than 18 years old with CVL placed within 14 days of ICU admission who developed a new CVL-related DVT were classified as cases. Patients with the same characteristics but who did not have any venous thromboembolic events were categorized as controls. Each case was matched to four controls based on age group, severity of illness, disease category and number of ICU days prior to CVL insertion. Primary outcome measure was ventilator free days (VFD) defined as number of days patient was alive and off MV within 28 days of CVL insertion. ICU free days (ICUFD) and mortality were the secondary outcome measures. Mann-Whitney and χ^2 tests were used for unmatched comparisons while Friedman and Cochran Q tests were performed for matched analysis.
RESULTS: Thirty-one patients with incident CVL-related DVT and 124 matched controls were identified from 1,149 patient admissions during the study period. The incidence of CVL-related DVT was 27 cases/1000 patient admissions or 4.7 cases/1000 CVL days. Patients with DVT were younger and in the ICU longer prior to CVL insertion. Demographics were comparable between cases and controls with matching. VFD was shorter in patients with incident DVT compared to controls with median of 24 vs. 27 days (P=.007 by Mann-Whitney test and P=.021 by Friedman test). ICUFD was less among cases with median of 3 vs. 23 days (P<.001 by Mann-Whitney and Friedman tests). Mortality was similar in both groups.
CONCLUSIONS: The shorter VFD and ICU-FD in patients with incident CVL-related DVT are consistent with our hypothesis that critically ill children develop PE which is usually undetected. VFD and ICUFD may potentially be used as surrogate outcome measures for trials on DVT. However, as most DVT do not have symptoms, the results of this study need to be confirmed by radiographically screening for DVT in children with CVL.

Abstract Author Index

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Notes

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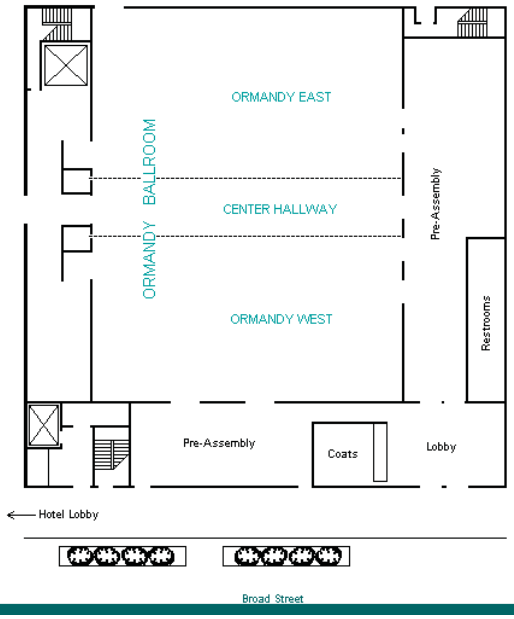

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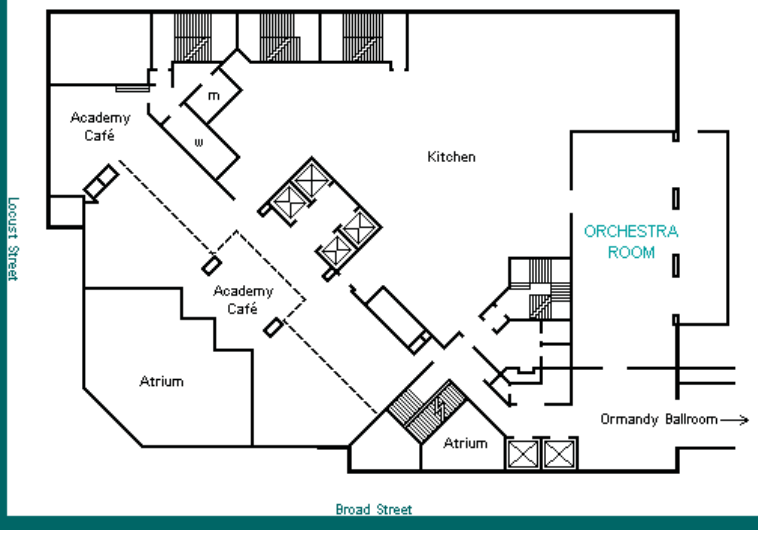

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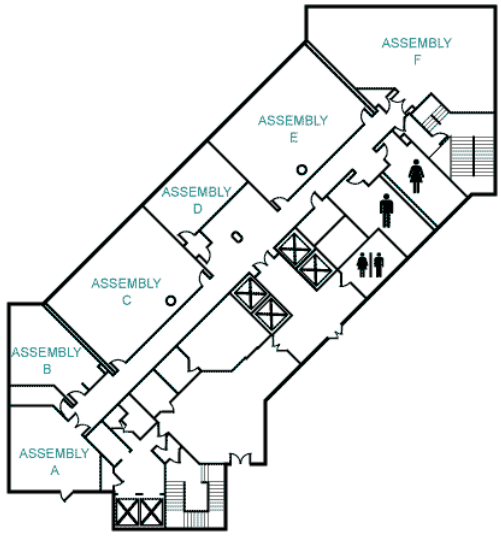

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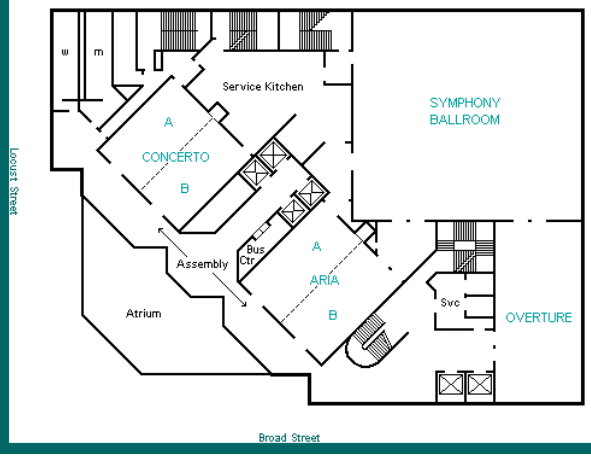

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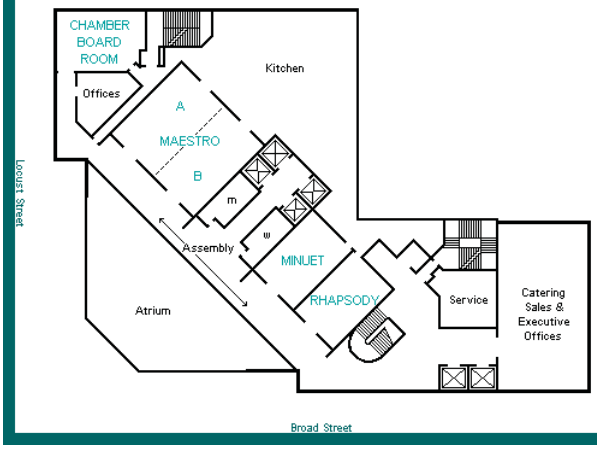

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